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SAFEGUARDING THE SPECIAL SENSES

H. O. REIK, M.D.

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SAFEGUARDING THE SPECIAL SENSES

GENERAL ADVICE REGARDING THE USE AND PRESERVATION OF THE EYES, EARS, NOSE, AND THROAT

BY

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ILLUSTRATED

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PREFACE.

FIFTEEN years of experience as a specialist in diseases of the eye, ear, nose, and throat has convinced the author that the majority of persons suffering from serious affections of these organs have arrived at that stage of their diseases either through ignorance of the normal use and functions of these parts of the body or as the result of neglecting to properly care for them. The child is not expected to know that snoring generally means obstructed respiration, that recurring attacks of pain in the ear mean an abnormal growth in the nose or throat, nor that inability to clearly see the school blackboard, or headaches following study, are indications of bad eyes. In very, very many instances parents, though more might well be expected of them, are but little wiser. Disinclination to study, a tendency to "hook school," or failure to maintain a satisfactory class standard are much more frequently due to poor vision or eye-strain than to original sin; parents are too prone to attribute a dislike of books to laziness or wickedness, and to try various forms of punishment, when a proper pair of glasses would really make that

child as fond of reading and study as are his classmates. What percentage of fathers and mothers realize even the immediate dangers of enlarged tonsils or adenoid growths, not to mention the more remote, but oftentimes serious, sequelæ of these abnormalities that are so common in childhood?

Second only to the crime of not properly safeguarding the health of his children is the sin the adult commits in neglecting to care for himself. Men and women doing the finest kind of eye-work in improperly or insufficiently lighted rooms; absolute disregard for ventilation in offices and work rooms, often even in the homes of the wealthy; failure to regard colds in the head or purulent discharges from the ear as of any consequence until some dangerous complication arises, such as pneumonia or meningitis; these are conditions commonly observed and attributable partly to ignorance, partly to neglect.

It is probably safe to say that 50 per cent. of the practice of specialists is made up of efforts to correct conditions that should never have been permitted to exist. They are constantly crying to the family physician and to the public that prevention is not only cheaper but easier and better than cure; that proper care of the eyes in early life prevents the onset of cataracts and

other intraocular diseases in old age, that the removal of bad tonsils and adenoid growths permits the child to develop normally and insures against certain affections of the ear and of the respiratory tract, that proper attention to colds in the head and early treatment of running ears would wipe out 80 per cent. of the cases of brain abscess and purulent meningitis.

Specialists are a body of medical experts who have devoted time and study to some special organs of the body and who, by so doing, have acquired not only a certain amount of knowledge of their functions and the means of restoring them to health when diseased, but, at the same time, have learned how a healthy condition of these organs might have been maintained. This knowledge they pass along to that larger portion of the medical profession, the general practitioners of medicine, the family doctors. They, in turn, are expected to utilize that knowledge in so far as possible and to instruct their patients in the simpler measures. Attainment of the latter portion of this desire is, however, not well provided for; the family physician is not sufficiently often consulted regarding preventive methods and the specialist is usually reserved for more or less serious conditions of disease. Unfortunately medical men have not had suffi-

cient opportunity to use their knowledge for instruction of the laity. Public lecture courses and occasional magazine articles reach but a small proportion of the public, and then deal with but a few topics relating to some one organ.

It is with the idea of presenting in one small volume, at a price low enough to bring it within reach of all who desire information on the subject, such simple facts and suggestions relating to the care of the eye, ear, nose, and throat as will enable reasonably intelligent persons to keep those special organs healthy and to recognize evidences of abnormality therein, so that they may promptly seek safe advice for cure, that the author has undertaken the task of writing this little book.

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CONTENTS.

	PAGE
I. The Eye	11
Structure and Function	13
Organic Defects	18
Eye-strain	24
Removal of Eye-strain	31
The Eyes in Infancy	38
Care During Childhood	41
Crossed Eyes	44
Reading Light and Position	47
Wild Hairs	48
Foreign Bodies	48
Granular Lids	49
Styes	51
Pink-eye (Conjunctivitis)	51
Iritis and Glaucoma	52
Cataracts	53
Tobacco and Alcoholic Blindness	56
Subjective Sensations that Should Call Attention to Possible Eye Disorders	57
How to Make Applications to the Eyes	60
II. The Ear	65
Malformations	73
Foreign Bodies in the Ear	74
Accumulation of Earwax	76
Diseases of the Drum of the Ear	77
"Catarrh" of the Ear	80
Nerve Deafness and Deaf-mutism	82
III. The Nose and Throat	87
Nasal Structure	89
Rhinitis (Cold in the Head)	92
Chronic Rhinitis (Nasal Catarrh)	94
Affections of the Tonsils	104
Adenoids	112

ILLUSTRATIONS.

FIG. FACE PAGE

1. Section of an eye showing various layers and most important elements of which it is composed. (Colored.) 12

2. Proper method of applying drops to the eyes 62

3. Showing lateral aspects of nasal chambers and neighboring structures. The turbinate bones are especially well depicted. (Colored.) 90

4. View of throat in which can be seen small diseased tonsils and parts of an adenoid hanging below the soft palate on either side of the mouth 108

I.

THE EYE.

Of the five special senses, that of sight is unquestionably the most important and the one most highly prized by the great majority of human beings. This is reasonably so, for what greater calamity can befall one than complete loss of vision? How sad for the individual, how pathetic even for the observer, are the sightless days of those who have previously delighted in occupations that depended upon their eyes; think how terrible is blindness to one who has loved books and who has derived his chief pleasure in life from reading! To be deprived of the enjoyment of art, to be shut out from observation of all the beauties of nature, to be forever denied another glimpse of the faces of loved ones; can anything more depressing, more disheartening, be imagined? If one pauses to consider these things the appreciation of good sight is immeasurably enhanced.

If then we fully realize the fact that perfect vision is one of our most valuable possessions it would seem well that everyone should have a

clear understanding of the structure of the eye and its physiological action in the function of seeing, some knowledge of the things that may happen to impair sight, and the ways to prevent or avoid such catastrophes. Before we can understand the workings of any piece of machinery or the things necessary to keep it in working order we must know something about how and of what it is made, must know the nature of the materials entering into its construction and what each part is designed to do. Just so, the primary step in studying any organ of the body is consideration of its formation and structure.

Comparison of the *unknown* with the *familiar* object is an easy and successful method of teaching; man reasons from that which he knows and understands and in the endeavor to conceive a new mechanism it helps materially if he can compare it with something of which he already has a fair conception. The human eye has been frequently and aptly compared to the camera of the photographer and, since kodakery has made this instrument a familiar one to so large a part of the populace, we may here employ the comparison for the purpose of instruction. The sclerotic may be said to form the box; the cornea the point of entrance for light, the amount of which is regulated by the iris acting as a shutter; the

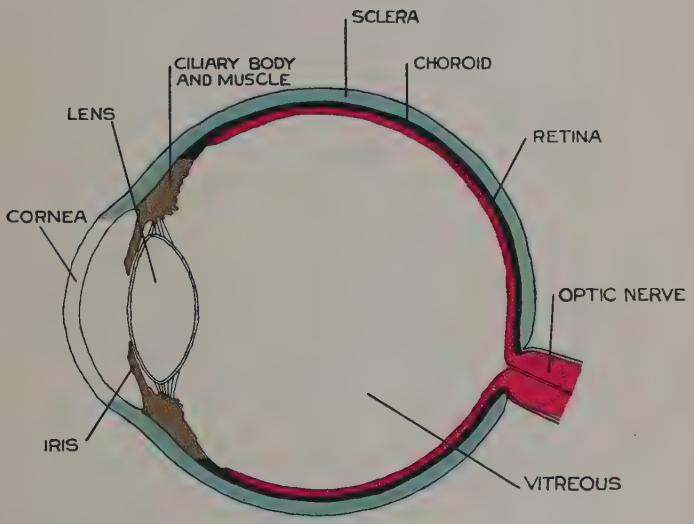

Fig. 1.—Section of an eye showing various layers and most important elements of which it is composed.

choroid furnishes the dark lining to nature's camera; the lens refracts the rays of light and forms an inverted image of objects on the sensitized plate, which is here represented by the retina; and the sensation produced by this negative, when transmitted to the brain, is converted into a positive and we "see" the picture. Yet, how inadequate is this comparison, how insignificant is the camera produced by man compared to the living camera! Consider the astounding adaptability of the human lens which can, and in the normal eye without perceptible effort on our part, focus for either near or distant objects, and, also, the remarkable rapidity with which one scene follows another as the eye roves over a landscape and yet every picture is received upon the same plate.

STRUCTURE AND FUNCTION.

The eyeball is a nearly spherical body about one inch in diameter. Externally it presents a tough, fibrous coat about one millimeter in thickness, and so resistant that it not only preserves the shape of the globe but affords excellent protection to the delicate contents. The front portion of this external coat, the *cornea* (glassy part of the eye), is transparent, while the remaining

four-fifths, the *sclerotic* (commonly spoken of as "white of the eye"), is opaque; posteriorly the sclera is perforated for admission of the *optic nerve,* a direct offshoot of special fibers from the brain. Just within the sclera, and resting upon it, is a second coat or membrane, called the *choroid,* which carries most of the blood-vessels of the eye and contains a considerable amount of pigment, so that it constitutes a dark lining for this optical apparatus. As this coat spreads forward toward the cornea its character changes somewhat, muscle tissue being developed within it to form the *ciliary muscle*—that governs the focusing action of the lens—and finally it drops behind the cornea in the form of a delicate, incomplete curtain—the *iris.* Both the choroid and the iris are covered on their innermost surfaces by a layer of flat, pigmented cells, and it is the varying amount of pigment in these cells, particularly of the iris, which determines the "color" of the eye. If a large amount of pigment is present we say the iris is black, or the individual has a black eye, while if less in amount we see brown, gray or blue eyes, and so on through varying shades of color down to the pink eye of the albino, in which there is practically no pigment; the pink color here being due to reflection from the deep blood-vessels through the un-

colored iris. Dark-complexioned people will usually have dark eyes and blondes light ones, but there is no scientific foundation for the popular notion that dark eyes are stronger than light ones. It is rather a question of evolution, and nature has provided those who live in tropical countries with a goodly supply of pigment, the better to protect them from glaring sunlight, whereas the more temperate and cooler countries furnish a larger proportion of fair eyes.

The iris does not form a complete curtain, but has a round, central opening through which all light must enter the eye, and which varies in size in accordance with the amount of light entering; when we are in a darkened room the *pupillary opening* is largest, but if we pass out into the bright light the sphincter muscle tissue of the iris is stimulated to contract and the *pupil* is reduced in size.

The *lens,* situated just behind the pupil, is soft, transparent, elastic, and contained in a capsule suspended by a circular ligament which is attached to the ciliary muscle. In the normal eye the lens should, in a state of rest, bring to a focus on the retina parallel rays of light, that is, rays of light coming from an object twenty feet or more away. Should we desire to look at some nearer object, we contract the ciliary muscle, the

lens capsule is relaxed, and the lens substance, through its elasticity, assumes a greater convexity, and thereby becomes stronger, so that it is enabled to focus upon the retina the divergent rays that emanate from an object near by. A simple experiment to illustrate this action, which is called the *accommodation* of the eye, may be tried in this way. Look at some object across the room and while doing so pass a pencil in front of the eye; you will observe the latter only indistinctly. Now, fixing your attention upon the pencil, you will see it distinctly, but the distant object, while still in view, has now become hazy; it is out of focus. The rapidity with which the lens successively focuses different objects at varying distances is one of the marvels of nature.

As soon as the optic nerve penetrates the sclera and choroid it spreads out over the latter in a thin sheet, the *retina,* which is one of the most wonderful tissues of the body. It contains those highly specialized elements which enable it not only to receive the image of an object, but to transmit the impression of that image, through the fibers of the optic nerve, to the brain, where its registry constitutes what we call sight. How this is accomplished is, and probably must always remain, a mystery. Professor Tyndall says: "When we endeavor to pass from the

phenomena of physics to those of thought, we meet a problem which transcends any conceivable expression of the powers we now possess. We may think of the subject again and again—it eludes all intellectual presentation—we stand, at length, face to face with the incomprehensible."

The retina is not equally sensitive in all its parts to visual impressions. A small area, called the macula lutea, or yellow spot, is the most sensitive portion, and in order to secure a clear and accurate view of any object we direct the eyes toward it in such relative positions as will allow the images to fall upon the yellow spot of each eye. The movements of the eye are controlled by a set of six muscles, four of which are so arranged that they can direct the eye upward, downward, inward or outward, and the remaining two, working in conjunction with these, give it a rotary motion. When the eyes are viewing distant objects the visual axes of the two are practically parallel and the muscles are at rest. As vision is fixed on closer things the visual axes begin to converge, and the closer the object comes to the eyes, the greater must become the convergence of the two eyes. You will remember, also, that the closer the object approaches the eyes the greater must be the accommodative action of the lens. The harmonious action of

these two sets of eye muscles is such that convergence is definitely associated with the act of accommodation without conscious effort, and thus binocular vision, the simultaneous use of both eyes, is maintained. If conjoint action of the muscles is interfered with and images are formed on unrelated portions of the eyes, two separate images, or double vision, results. Should the dissociation be sufficiently marked to cause one eye to turn in or out much more strongly than the other, we say that eye "squints" or has a "cast."

ORGANIC DEFECTS.

Refraction of light is the bending which its rays undergo in passing through media of different density, and, according to physical laws, rays of light passing from the air through a medium of such character and shape as the human lens are converged to a point on the other side, which point is called the focus of the lens. An eye that refracts parallel rays in this way accurately upon the retina is said to be *emmetropic*. Should the eyeball be flatter than normal, that is, have a shorter anteroposterior axis, the retina will be situated in front of the focal point of the lens and, hence, will not receive a distinct image;

just as in the use of your camera, if your plate and lens are too close together—if you have focused too short—you will get a blurred negative. Such an eye is said to be *hypermetropic* (sometimes called oversighted or far-sighted). The term "far-sighted" is misleading, has caused much confusion in the public mind, and should be expunged from our vocabulary. The hypermetrope is not far-sighted, that is, he does not see farther than the normal-eyed person. He does often see as far as the person with normal eyes, but he does even that well by a trick. It has been explained that the normal eye is in a state of rest when looking at a distant object. That is to say, if looking at some object in the distance the eye sees it without making any effort whatsoever; the eye is as quiescent as the photographer's box that has been set for a distant view. Now, if the hypermetrope attempts to see that same object from the same distance he can do so only by correcting his natural defect; this he does by calling upon his ciliary muscle to focus the lens sufficiently to bring the image forward to the plane of his retina. This means that even for distant vision, when the eye should be in a state of rest, almost constant muscular effort is required and power that should be saved as a reserve force for close work is being drawn upon.

The person with normal eyes looks at distant things without effort and uses his focusing ability only for looking at closer objects, the greatest amount of power being required in such acts as reading, writing, sewing, etc. He comes to such close work with rested and active muscles. The hypermetrope, on the other hand, being forced to use muscular power in his distant vision, comes to his close work with muscles that are tired and is, besides, required to call forth an extra amount of energy; this accounts for the discomfort experienced by these people when doing school work or following occupations requiring close application of the eyes. The act of focusing for distant objects is to them an unconscious thing, of course, the ciliary muscle being what is called an involuntary muscle, one that responds perfunctorily when the eye is directed at something and not because of special effort put forth, and, so, they are not aware that in claiming "far-sight" they are taking advantage of the normal-eyed competitor; it was referred to as a trick, but, it is unconsciously performed.

Myopia, commonly called "near-sightedness" or "short-sightedness," is an exactly opposite condition, that is, the eyeball is elongated—has an unusually long anteroposterior axis—and the image is naturally formed in front of the retina.

Here again a blurred image would result; comparing the condition once more to photography, it matters not whether you have focused a bit beyond or a bit short of the plate, the result will be a blur. The hypermetrope has the power to alter his defect by focusing, but the myope has not; the ciliary muscle is fully relaxed in the normal eye and the lens set for distant vision, and, as it cannot be further relaxed, the myope cannot reduce the strength of his lens to meet the abnormal condition. He must therefore approach closer to the object or hold it closer to his eyes, if he would see it. You have observed the very myopic person holding small things very close to his face or putting the face down to the desk until it almost touched the book; and you know they are shut off from distant vision so that they cannot recognize friends across the street, or sometimes even at much closer range.

Hypermetropia and myopia are the principal defects of the eye due to variations in size, but there is a third and perhaps a more important one, that is the result of abnormal shape. *Astigmatism* is a condition of faulty refraction that results from defective curvature of the corneal or lens surfaces. If, for instance, the cornea is not a true section of a sphere, but has a greater degree of curvature in one meridian than in

another, light will be refracted by it unequally in these different meridians and, again, a blurred image formed. An eye may be perfect as to the length of its anteroposterior axis, but have an irregularity of curvature of the corneal surface; this condition is called simple astigmatism, and may be either hypermetropic or myopic, according as the defect tends to cause a focusing of part of the image beyond or in front of the retina. Astigmatism, however, occurs not only as such alone, but may occur in combination with hypermetropia or myopia; a condition known as compound hypermetropic or compound myopic astigmatism. That is, an eye may be not only shortened or elongated, but have an irregular corneal surface as well.

Astigmatism is existent to some degree in almost all eyes. It sounds rather startling to say that there are few, if any, perfect eyes. Consider for a moment, though, that nature has succeeded in making very few perfect spherical bodies; the world itself is believed to be flattened at the poles. Careful scientific measurement will show the presence of refractive errors in nearly all eyes, though the error may not be of sufficient degree to cause any inconvenience, or the person having the unsuspected defect may live in that blissful state by virtue of the fact that he has the strength

to bear the tax upon his muscles without suffering discomfort. The amount of discomfort produced, however, by unsuspected astigmatic errors almost surpasses belief. Thousands of people are suffering from the far-reaching effects of refractive errors without for a moment suspecting that the eyes are in any way connected with their troubles; but of that we shall speak later on.

There is still another optical defect to be considered, one which comes to all eyes alike if they reach the period of old age. *Presbyopia,* commonly called "old sight," is simply a natural diminution of power to focus or accommodate the eye for different distances. Ordinarily this loss of power begins at about the fortieth year of life and, as age creeps on, the lens gradually undergoes a change, loses its elasticity, and the power to assume greater convexity fails. The most obvious feature of this change is the gradual receding of the near-point of vision as shown by the necessity for holding the book or paper farther from the eyes when reading. Persons between forty and fifty, who are loath to put on glasses, often insist that they can read as well as ever, while, at the same time, you observe that they are holding the paper at arms' length to enable them to do so; a fact which proves of itself that they are failing in visual power. A

patient recently rather cleverly described this mental attitude in his own case by saying "Well doctor, I guess I shall have to come to the glasses. I can still see as well as ever; my eyes are good, but my arms are too short."

EYE-STRAIN

In the preceding paragraphs we have considered only the structure and function of the eye, referring mainly to normal organs, and have alluded to abnormalities of formation only in sufficient degree to establish a basis for understanding such irregular formations and performances as constitute or serve to produce diseased conditions.

In all the possible errors of refraction that we have pointed out, however, it has been shown that there is imperfect focusing of objects on the retina, and in order to secure that perfect focusing which is essential to distinct vision the delicate muscles of the eye are kept in more or less constant action. Remember that the muscles of the iris and of the ciliary body cannot be seen in the ordinary dissection of the eye, but become visible only under a microscope. When we consider the small size of these muscles it is surprising that they are able to work so continuously

and to perform such enormous tasks with such comparative ease. In very many instances of slightly defective eyes they carry the burden without complaint; in some cases, where the error is gross and the burden too heavy, they rebel and the victim seeks assistance promptly; in very many more instances, possibly in the majority of all cases, they struggle on, making a desperate effort to carry the load, become strained, and cause a variety of distressing symptoms, not limited to the region of the eye alone, but widespread throughout the system. You are familiar with the size and power of the biceps muscle of the arm and with the large, strong leg muscles, and, likewise, know the effect of long exertion of these muscles; how when a man has walked all day or swung an axe for hours not only do those strong muscles of the leg and arm become tired and sore, but he feels the effect all over his body; perhaps he has headache, cannot digest his food, does not sleep well, and even such organs as the heart and kidneys show the result of overexertion. Compare with those muscles the delicate, macroscopically invisible, internal eye muscles and you will not be surprised at how far-reaching may be the effect of straining them by prolonged, incessant labor. Thousands of us think little of working our eyes,

probably defective ones at that, sixteen hours or more per day, year after year, yet wonder why they feel tired at times, or find it hard to understand how such a local strain can account for general ill health or a derangement of some other organ of the body. Did we work any other muscle or set of muscles in the body one-half so hard or so constantly as we do the ciliary muscles of the eyes, we would be physical wrecks in short order. It is the direct and reflex effects of eye-strain that we shall now take up for brief consideration.

Usually the first symptom which calls attention to a refractive error is the occurrence of discomfort whenever the eyes are employed in close work. This irritation may manifest itself in various ways: there may be simply a tired feeling about the eyes; a sense of drowsiness or heaviness of the eyelids; a tendency to fall asleep after a very brief period of reading; twitching of the lid muscles, sometimes amounting to a regular spasm that forces closure of the lids for some seconds, until recovery takes place and the eye can be opened for the resumption of work; a vague sense of heaviness or discomfort over the brow; and, a pronounced headache. These may be classified as local evidences of eye-strain and indicate rather the acute symptoms or those ob-

served in the beginning of the trouble. Among the characteristic local features of the more prolonged or chronic cases of eye-strain are to be enumerated: congested eyes ("bloodshot"), giving one the appearance of being an alcoholic; red and encrusted lids; styes, which are infections made possible through local weakness of the tissues; narrowly contracted lid apertures or wrinkles under the lids or over the brows, from the constant muscular effort made to overcome visual defects; and, pain in the eyes or forehead.

When we come to enumerate the *reflex* symptoms of eye-strain, symptoms that are referred to other parts of the body than the eyes, we enter upon a very broad subject. There is nothing in the whole realm of medicine, however, a knowledge of which is of greater importance and value to the intelligent layman than this fact, *that a defect in the eyes can be the cause of disturbances and derangements of portions of the body apparently remote from the eyes.* Sometimes these reflex symptoms occur in conjunction with one or more of the local eye symptoms mentioned above. Quite frequently they appear without any localizing eye symptoms, and then the patient may suffer for a long time before his attention is attracted to the eyes as a possible cause of trouble. To add to the difficulties of solving this

puzzle, a definite ocular defect does not always cause the same symptoms in a number of different persons. Thus, a certain degree of hypermetropic astigmatism, let us say, produces in the first man inflamed lids or red eyes; in the second, headaches; for a third, some form of nervous manifestation, such as twitching of the lid muscles, choreic movements of the face, or even epileptic convulsions. It is these facts that make it necessary to consider carefully the remote evidences of eye-strain and how they can be detected.

Headache is perhaps the most common of these reflex symptoms and the one most widely recognized now as of ocular origin; *probably the vast majority of repeated or recurring headaches are attributable to defective eyes.* Oftentimes the connection is recognized from the fact that the headache appears in association with or immediately after use of the eyes for close work, as in reading, writing, sewing, drawing, fancy work, visits to art galleries, or sightseeing. Car-sickness is a kindred type of eye-headache, the effect upon the eyes of watching the various objects rapidly passed being much the same as that of reading or other close work. Occasionally the headache does not appear as an *immediate* consequence of the tax upon the eyes, but comes

on some hours afterward; as witnessed in some persons who awake with a headache in the morning after employment of the eyes at night. The character of the headaches induced by overstrain of the eyes varies greatly, and ranges from slight pain in or over the eyes to the most severe type of "sick-headache"; in the latter group of cases the eyes may have withstood the strain for considerable periods of time and then there comes an explosion, as it were, the headache being accompanied by nausea, vomiting, serious depression, the whole attack lasting for several days and completely incapacitating the sufferer. A not inconsiderable percentage of drug fiends have acquired their bad habits from the use of remedies for the relief of headaches, and the number of hard-worked men and women (especially bookkeepers, clerks, sewing girls, milliners, and others engaged in service requiring close application of the eyes) that are daily consuming large quantities, often dangerous quantities, of headache powders and tablets is as alarming as it is surprising; *in nine cases out of ten they do not need drugs, but proper attention to their eyes.*

Next to headaches, one of the most commonly observed reflex effects of eye-strain is *disturbed digestion.* It has long been recognized that any nervous shock to the system may arrest the

process of digestion and produce nausea, and it is easy to understand that persistent and prolonged nervous agitation can so derange the digestive function that a fixed impairment thereof results. Many long-standing cases of dyspepsia, indigestion, or other stomach disorders, that have resisted years of treatment by lavage and medicines, have been promptly cured upon the patient having, for some other reason, had his eyes cared for. *When digestive disturbances occur to people who are using their eyes a great deal, and there is present no recognizable organic lesion of the stomach, suspicion should be turned upon the eyes and an examination for some visual defect made.*

A long list of reflex disorders of ocular origin that might now be given would consume an unnecessary amount of space and perhaps prove more tedious than helpful to the reader. Suffice it to say that a large number of cases of *nervous trouble, hysteria, neurasthenia, nervous prostration, chorea,* and *epilepsy* are brought about or provoked by the strained use of defective eyes. The writer desires to avoid misunderstanding on this question. No one would claim that all cases of these diseases are due to eye-strain nor that they can aways be cured or even relieved by treatment of the eyes; it is only meant to explain that

eye-strain certainly is a causative agent in the production of these serious conditions in a considerable number of instances. In the most serious condition mentioned, for instance, epilepsy, it has been repeatedly shown that eye-strain may be the factor that provokes the epileptic seizure, and that the wearing of glasses to correct the visual defect prevents further attacks. In this disease, as in most of the reflex conditions referred to, there is an underlying weakness of the nervous system, or of some specific organ, that manifests itself whenever the eye-strain reaches a point of severity sufficient to overcome the patient's normal resistant power. In such cases cure or relief follows removal of the *exciting cause;* the excitable nervous system, or weak stomach or other organ, cannot be disposed of, but can be protected.

REMOVAL OF EYE-STRAIN.

From what has been said above concerning the causes of these refractive errors, it is evident that no amount of treatment will remove them, since we cannot change the shape of the eye to any desired form. We can, however, by means of proper glasses, bring about a condition of emmetropia. Where hypermetropia exists, a

glass with convex surfaces is used to converge the light more strongly and relieve the lens and ciliary muscle of that necessity. In myopia, a concave glass is required to cause a divergence of the rays, and thus extend the focus of the lens backward through the abnormally long eye to the retina. For astigmatic conditions, glasses are ground so as to have a different power of refraction for different meridians.

Do not suppose for a moment, however, that the adjustment of correcting glasses is purely a mathematical problem. The human eye is not a mathematical optical instrument and cannot be treated as such. In almost every case one must consider a number of other points of great importance, points which deal with the anatomy and physiology of the eye, the general health and muscular tone of the patient, and these can be properly appreciated only by one who possesses a thorough knowledge of medicine. The selection and prescribing of the correct glasses is just as much the practice of the art of medicine as is the choosing and prescribing of the proper medicinal remedy for any diseased condition. Consequently, the only competent individual to examine the eye is the physician who has given special attention to the science of ophthalmology. The newspapers, street-cars, and other adver-

tising media are filled with the alluring signs of the optical quack, the most attractive feature of whose advertisement is "Examination made free of charge." The thoughtful will see at once that the optician can no more afford to "give something for nothing" than can any other business man, and those who fall into his trap will likely discover that the advertisement is a falsehood. The optician is in no sense qualified to make the proper examination for glasses. He has his legitimate field of labor, but it should be understood by all that there exists the same difference between the oculist and the optician as between the physician and the druggist; the latter may occasionally give relief by administering a dose of medicine, but one would hardly argue from this that he is competent to prescribe, or safe to consult, for any ailment whatever. Some one of my readers may be wearing with comfort glasses selected by one of these men, or even chosen from the tray of a peddler or street vendor, but such person has taken grave risks with the most valuable organ of his body, and a large percentage of the people who pursue such a course suffer therefore in one way or another.

It is the business of the physician to diagnose disease, ascertain the cause thereof, and to prescribe the correcting remedy; while to the phar-

macist, on the other hand, is entrusted the duty of preparing drugs, compounding the prescriptions, and supplying the patient with the ordered remedies. In like manner, the oculist studies the character of ocular defect, the alterations in physiological action produced thereby, considers the anatomical, physiological, and pathological elements in the case, and then calculates the character of glass that can best promise good vision and comfort; the optician, like the druggist, has a kindred but a different profession—that of constructing from a simple piece of glass a lens which shall have the desired refractive power, and so adjusting it in frames that the patient can wear it in front of the eyes in such position that its varying refractive portions shall properly cover the defective parts of the eye—a profession based upon a thorough knowledge of optics and marked mechanical skill. Neither of these men can change positions; the physician, unless also educated in pharmacy, is not capable of filling his own prescriptions; the pharmacist knows little or nothing of the art of prescribing for diseases; the oculist is not taught to grind lenses nor fit frames; the optician is utterly incapable of appreciating the various medical elements at stake in the ocular conditions that require correcting glasses, and is therefore unfit to examine eyes

for such purpose or to prescribe glasses. It is a very serious mistake to suppose that these eye examinations are simple matters, and that any glass that one can see through is good enough to use; as we have attempted to show, it is usually not a question of what one can see, but whether they can see normally without tax upon the eye or system, and glasses are given most frequently not to make people see better so much as to make them see well with comfort and safety. The jeweler, the pharmacist, the department-store keeper, and the spectacle vendor are not, then, the proper persons to examine eyes or furnish glasses. The examination should be made by an expert oculist and his prescription for glasses be filled by a skilled optician.

In this connection one more word of caution may not be out of place. Some of the department stores and jewelers advertise that their spectacle departments are presided over by a physician or a trained man who poses under some high-sounding title, such as "Optometrist" or "Graduate Refractionist." In the vast majority of instances these are fraudulent pretenses. As to the alleged physicians in these places; they are sometimes men who have failed to pass their medical examinations, or failed to win success or professional standing in their medical work, or,

worse, have simply assumed the title; of one thing you can be quite sure, no self-respecting physician of any ability will enter into such an alliance to defraud the public. As regards the gentlemen of special titles referred to, the title is the most imposing and important portion of their equipment; usually they are very deficient in knowledge of either medicine or optics. It must be acknowledged that not all oculists and opticians are as highly skilled and reliable as they might be. Some eye specialists are excellent surgeons in the treatment of that organ, and have only moderate ability as refractionists; if you were to undergo any surgical operation you would choose the most skilled and expert surgeon at your command; in the same way it is equally to be recommended that when needing an examination for glasses you should choose the eye specialist who is most skilled in this particular part of his branch of medicine. In selecting an optician a similar rule should apply; go to that one who is reputed to do the most careful work in making and adjusting spectacles.

Some people object strenuously to the wearing of spectacles, especially by children, and express the fear that "if they once begin to wear them they are afraid they can never leave them off again." To fight against the assistance which art

may supply in this direction is as absurd as to refuse to eat when hungry or to sit down when tired. Why should they not be worn through life, if by their aid discomfort is removed and sight preserved; while through their lack vision is indistinct, eye-pains or headaches prevail, and the tendency is toward the destruction of the eye and the general impairment of health? It would be just as sensible for the lame man to refuse the aid of crutches—because he can never hope to walk again without them. The use of glasses in early life, of the proper kind and at the proper time, has saved many a person not only from immediate discomforts, but from calamities far worse than the ill looks or slight inconvenience of having to wear spectacles. We once believed that nearly every one would have cataracts if they lived long enough. It is known now that cataracts and many other serious affections of the eyes in elderly people are the result of neglect in early life, and that by the use of glasses at the proper time to prevent eye-strain, with its consequent injury to the nervous and vascular structures of the eye, such diseases can be avoided. Indeed, as the result of the past twenty years or so of careful and accurate refraction work, cataracts are much less common today than they were a generation ago.

THE EYES IN INFANCY.

The need for special care of the eyes begins at a very early period of life. It is the duty of both the doctor and the nurse to watch the baby's eyes carefully during the first week of life, as one of the worst diseases to which the eye is liable is prone to make its appearance about the second or third day, rarely later, and unless very prompt medical attention is secured it may result in blindness. This affection is called ophthalmia neonatorum (meaning eye-inflammation of the newborn), and it is a purulent disease of great virulency. The lids become red and intensely swollen, and pus flows out very freely, often seeming to reappear as fast as it is wiped away. If neglected the cornea soon ulcerates, and in such cases, even if the inflammation is then checked, an opacity appears where healing takes place, and vision is forever interfered with; in the less favorable cases, where the disease succeeds in forcing a perforation of the cornea, the interior of the eye is infected and the whole structure destroyed, leaving only a shrunken, sightless globe. In our public institutions for the blind a larger percentage can trace their affliction to this disease than to any other single source. And yet, it is a *preventable disease*. The infection really

occurs at the time of birth by contamination with infective vaginal secretions. If immediately after birth the eyes are carefully cleansed and a few drops of a 1 per cent. nitrate of silver solution, or of a 5 per cent. solution of argyrol or protargol, be placed upon the eyeball, the disease will not develop, in the majority of instances, even when the child has been delivered through a canal believed to have been infected. Inasmuch as such drops, properly used, can do no harm, it should be the universal routine practice of physicians and midwives to treat the baby's eyes in this way. The fact that this custom has not been more widely adopted depends in some degree upon the attitude of the public toward purely preventive medicine; many parents are averse to having drops applied to the baby's eyes unless there is visible evidence of existing disease. Of course this position is due really to lack of understanding, and when they come to fully realize that there is no danger in so simple a precautionary measure against a possible infection, and further recognize the fact that the disease to be guarded against is so terrible a one that if it once gets a start it is almost certain to produce a serious condition if not complete blindness, the prejudice against this preventive measure at least must disappear.

To those poor mothers who are entrusted to midwives, women who are not educated in the employment of preventive medicines, we can only say that the very moment you observe any evidence of eye trouble in the infant you must immediately demand the services of a physician; in the larger cities, where this disease is far more prevalent than in country districts, it is always possible to secure the attendance of an expert from one of the many eye hospitals. The affection is amenable to treatment if this be instituted promptly, but delay is extremely dangerous, even a few hours often sufficing to impair the vision seriously. Do not waste time in following the suggestions of old women nurses who place unbounded faith in the use of "mother's milk," "tea-leaves," "chamomile tea," etc. Such remedies are absolutely valueless in this or any other affection of the eyes, and not infrequently do much harm. Those who have the care of the baby, in giving the necessary attention to a case of this kind, must be very careful thoroughly to cleanse the hands after having touched the patient or any article that might have become contaminated by the secretion, for a minute particle of this secretion introduced into the eye of an adult may cause rapid loss of that eye; the same disease is apparently much more virulent in the adult eye

than in the baby's, and the eye may be destroyed in the short space of a few hours in spite of prompt and vigorous treatment. The attendants should, then, most carefully cleanse their hands after every treatment or washing of the baby's eyes, and special care should be exercised to prevent others from using the same towels or handkerchiefs employed in the sick-room for any purpose.

CARE DURING CHILDHOOD.

During infancy the child should be guarded against glaring lights in the house, or direct sunlight out of doors, and the growing youth should be encouraged to take part in outdoor amusements rather than devote too much time to books and small toys. The inflammatory affections of the eye are usually quickly recognized and submitted to treatment. Errors of refraction, however, are not so apt to be detected promptly during childhood, and it would seem to be a part of wisdom to have every child's eyes examined at the beginning of school life, and, where defects are found, to have other examinations from time to time thereafter. If this were universally done it would aid greatly in the advancement of those children who start out in life with congenitally defective eyes, would secure for them proper care

of the eyes, and prevent the serious effects of eye-strain, and would lessen the chances of conveying these defects to future generations. We frequently meet with children who have been severely punished both at home and at school because of a pronounced dislike of study or an apparent dullness in school work, with inability to keep up with their classes, when investigation shows that the children are in no way to blame, but are laboring under a handicap in the form of defective vision.

Dr. S. D. Risley, of Philadelphia, who has devoted much time to a consideration of the influence of school work upon the eyes, and who has published a most comprehensive paper on School Hygiene, says: "It is highly important that every child seeking to enter the schools should be subjected to a systematic examination as to the state of their vision, and, where this is found defective, parents should be notified and advised of the probable harm which will result from the school work if professional advice is not secured. The skillful correction of the errors of refraction in our children's eyes, by glasses, would go far to arrest the acquisition of near-sight and its attending pathological conditions, and in most cases would prevent also the discomfort which precedes and accompanies the increase of refrac-

tion. The following suggestions should be borne in mind as important: (*a*) Sufficient light, properly admitted to the schoolroom, should be regarded as a fundamental requirement in schoolhouse architecture. The light should be admitted from the left side of the pupils, and the ratio of window surface to floor surface should never fall below one to five, and this should be exceeded in many localities, on the north side of buildings and on the ground floors. (*b*) The desks and seats should be of such a pattern as will permit independent adjustment as to height and size, to meet the requirements of individual pupils and to insure upright sitting. (*c*) Instruction should be imparted as far as possible by means of blackboards, wall maps, charts, and orally, instead of by work at a near point, as with pencil and paper or slate. Where the work must be done at a near point, a pen and black ink should be used instead of a lead-pencil or slate and pencil. (*d*) The work required to be done at home should be in a large measure abandoned, or at least largely reduced. (*e*) A more elastic curriculum of study is desirable for pupils with weak eyes or feeble health, which will permit the lengthening of the school life and at the same time admit of steady promotion. (*f*) Great care should be exercised in the selection of properly printed

textbooks. Only good paper, and type no smaller than eight-point, or preferably ten-point, are admissible in schoolbooks, and these should be bold-faced and well spaced, on a double-column page. For the former a distance of two millimeters between the lines, and for the latter a distance of two and one-half millimeters, should be required. (*g*) In writing, the central position of the paper should be maintained, but in properly lighted rooms with suitably arranged seating the kind of script, vertical or slanting, will depend upon the vertical or the inclined position of the paper, and may safely be left to natural selection."

Some of these suggestions are equally adaptable to the home life or office work of the adult.

CROSSED EYES.

A "squint" or "cast" of the eye is said to exist when one of the external eye muscles acts in excess of its opponent so that when one eye is directed straight ahead the other turns in or out, up or down. The most common form is that known as "cross-eyed," and generally makes its appearance between the third and fifth years of age. In very many instances the mother believes that the child became so afflicted through fright, through imitation of some other child or

servant, or as the result of an accident while under the supervision of a careless attendant. Generally there is no true basis for this reasoning. It is at about this age that the child begins to use its eyes for close work, to study pictures attentively, or to play with small objects. If the child has a high degree of hypermetropia it is compelled to employ considerable muscle power to focus near objects and to converge the two eyes so that both shall participate in the act of seeing—binocular vision. Now this is an extreme tax upon the delicate muscles of the young child, and something has to give way. Close work could be abandoned, but the child, not being able to reason out the cause of its discomfort, does not arrive at that conclusion. Nature then attempts to afford partial relief by giving up the effort to use both eyes simultaneously, doing away with the converging act. As the two eyes are seldom exactly alike in these children, nature selects the better one for seeing purposes and turns the more defective one in toward the nose, thus throwing it out of commission. Should the eyes be very nearly alike it may require some time to determine which eye shall be selected, and in such cases we may observe the child squinting sometimes with one, sometimes with the other, eye (alternating squint), until nature makes her

selection and the squint of one eye becomes fixed. So, crossed eyes are not usually the result of injury or neglect nor evidence of the acquirement of bad habits; they result from nature's effort to relieve the child of a burden imposed upon it by a serious error of refraction.

This also explains why in its early stage a crossed eye may sometimes be made to assume its proper position through the aid of proper glasses to correct the refractive error. Such children should be placed at once under the care of a competent oculist. If the condition is neglected until the eye has become more or less fixed in its faulty position, glasses alone will not be sufficient to correct the deformity; then an operation will be required to bring the eye back into position, and glasses will still have to be worn to maintain it so. However, practically all cases of crossed eyes, even of many years' standing, can be rectified, and when one considers what a difference in personal appearance it makes, the disagreeable effect of such an eye upon those who must come in contact with the afflicted person, and the simplicity of the operation, it looks like a sin against the community to allow such persons to retain their deformity.

READING LIGHT AND POSITION.

We are too often careless in the matter of securing good light to work and read by. The most desirable source of light is from above, behind and to the left of the body, and it should thoroughly illumine the work without shining directly or casting reflections in the eyes. As an artificial light the incandescent electric is the best; but as it is not available to the majority of people, dependence must still be placed in gas or coal-oil. The use of incandescent mantles has much improved the gaslight, making it whiter, more like daylight, and also much steadier. In country districts where coal-oil is the only illuminant, the so-called student-lamps will furnish a very satisfactory light for reading and fine work. The points of most importance in this connection are that the light shall be sufficiently bright to thoroughly illumine the work without dazzling reflections, and from such a direction as to avoid shadows on the field of vision. If a position cannot be taken which will prevent the light striking directly upon the eye, a shade may be worn on the forehead. Reading while in a recumbent position is generally inadvisable, since the strain upon the eye muscles is somewhat increased and it is difficult to secure as good light upon the

book. The latter is the chief objection, and if pains be taken to place the couch in such position, in relation to the windows or the artificial source of lighting, as to secure a proper illumination of the reading matter, there is no serious objection to reading while lying down.

WILD HAIRS.

Wild hairs are eyelashes which have, as the result of inflammation of the lids, become turned in so that they scratch the eyeball. Sometimes they may produce great discomfort and injury, but they are nothing like so common as is generally supposed, and very many people pull out their lashes under the mistaken belief that they have wild hairs, when they are suffering from irritation due to some entirely different cause. A good set of lashes should not be interfered with, as they are important agents in protecting the eye from foreign bodies.

FOREIGN BODIES.

Travelers on the railroad and laborers engaged in such occupations as stone-cutting, tool-grinding, etc., are constantly in danger of catching foreign bodies in the eye, and such injuries

may vary in effect from a simple temporary inconvenience to complete loss of the eye. The best means to prevent such accidents is to wear some simple protection—spectacles or goggles. Unless the substance imbeds itself in the cornea, its most common hiding place is just under the edge of the upper lid, whence it can easily be removed by everting the lid and wiping it off. The natural tendency of foreign bodies, not imbedded, is to be washed along toward the inner corner of the eyelids, where they give no trouble. A very common practice is to introduce "eye stones" or flaxseed under the lids to chase out the cinder or bit of dirt; the smooth seed, being naturally carried along to the inner corner, is expected to push the foreign body before it. This is not a good practice, however, and has occasionally produced considerable trouble. Unless the foreign body can be readily removed, the prompt assistance of an expert should be secured.

GRANULAR LIDS.

The condition to which this term is properly applied is the disease technically called "trachoma," but the vast majority of people who think they have granular lids are merely suffering from a slight irritation or inflammation of the

lid margins, the result of eye-strain. True trachoma is a very serious disease, a specific infection of the tissue lining the inner surfaces of the lids and the fold between the lids and the eyeball. When the lid is everted the surface is discovered to be rough and granular in appearance (whence is derived the common name), and this roughened surface soon causes an irritation, or even an ulceration, of the delicate cornea, with consequent impairment of vision. Fortunately, the disease is not very common in this country, being practically limited to the lower classes of foreign immigrants, mainly the Russian or Polish Jews, and appears but very rarely among Americans of cleanly habits; nurses and physicians sometimes become infected, through no fault of their own, while treating patients who have the disease, but, otherwise, true granular lids are rarely observed except among the unclean, poverty-stricken portion of our tenement dwellers.

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The encrusted, inflamed, and roughened lid margins frequently seen and sometimes mistakenly spoken of as granulated lids are generally not a serious condition, but an annoying one that produces a very unpleasant sensation and an unsightly appearance. Examination of such eyes usually shows an error of refraction, and

the wearing of correcting glasses cures the lid trouble.

STYES.

Styes are localized abscesses of the lid margin. They are caused by germs gaining entrance to the little openings of the small gland-ducts around the hairs or lashes and causing a purulent inflammation. A local swelling with redness and pain results, pus is formed, and in time the stye bursts and discharges its contents. They have a tendency to occur in crops, one following another, because such infective germs are more or less constantly present on the skin, and the fact that the first one appeared means that the local resistance to infection is below normal. As has been stated elsewhere (on page 27), this reduction of local resistance is generally the result of eye-strain. Removal of the cause prevents a succession of styes, and opening the existing one, followed by application of heat, preferably in the form of bathing with hot water, to promote absorption and healing, is the quickest way to cure the affection.

PINK-EYE (CONJUNCTIVITIS).

An inflammation of the mucous-membrane covering of the eye that occurs often in epidemic

form. It is an infection and is easily spread in schools or public places where people congregate. The technical name for it is conjunctivitis, and it responds very promptly to proper treatment, but *it is not safe to rely upon home treatment of any eye inflammation.* Its most prominent symptom is redness of the eye, but, as that is a symptom that is common to all eye inflammations, and accompanies such serious eye diseases as iritis and glaucoma, it is readily understood that the layman should not depend upon his own judgment in making the diagnosis.

IRITIS AND GLAUCOMA.

Iritis, as the name implies, is an inflammation of the iris, the colored part of the eye, and in addition to the intense redness of the eye observable it is marked by considerable pain. It occurs frequently in association with rheumatism or other blood disease, and unless promptly treated may cause loss of sight.

Glaucoma, while not so commonly seen, is yet not a rare disease. It consists essentially of a gradual hardening of the eyeball and loss of sight through the consequent pressure upon the nerve of vision. It may occur in either an acute or chronic form, and the former type is accom-

panied by most excruciating pain. In the acute form, prompt treatment, usually an operation, offers the only hope of saving the sight. It should be needless to say that a competent physician should be consulted immediately for any inflammation of the eyes.

CATARACTS.

Cataract is the term used to describe an opaque lens. There are a number of different forms, as, for instance, the congenital cataract, a child being born with opaque lenses or opaque spots in the lens; traumatic cataracts, where the opacity results from an injury—but the word is most commonly applied to that condition known as senile cataract, an opacification of the lens occurring spontaneously in elderly persons. It was formerly assumed that all persons would develop cataracts provided they lived to sufficiently old age, but it is now believed that this was a mistake, and that cataracts probably occur principally to persons who have not taken good care of their eyes throughout early adult life. Abuse of the eyes by overwork or failing to correct ocular defects in time, by proper glasses, causes eye-strain, and the accompanying or consequent interference with the nutrition of the

lens results in a gradual loss of its transparency. The victim first notices some difficulty in seeing small or fine objects and a gradual loss of ability to read or to follow occupations requiring clear vision. The development of a cataract may be rapid or slow, and sometimes several years intervene between the first impairment of vision and complete loss of sight or even sufficient loss to enforce abstention from all close work. Generally both eyes are involved, but one becomes cloudy much sooner or more rapidly than the other. It is fortunate that this is so, for it often enables the patient to have the worst eye operated upon and its vision restored before the second eye requires treatment. The period at which treatment is instituted has been called the time when the cataract is "ripe," and may be described most simply as the time when the patient can no longer see well enough to count fingers at arm's length or to read ordinary print.

The only treatment worthy of consideration is surgical; the various advertisements of remedies to "remove cataract without the use of the knife," to "cure cataract by absorption," etc., are utterly unreliable. The opaque lens must be removed, since it is acting as an obstruction to the passage of visual rays to the retina, and this can only be done by making an incision in the

cornea and taking the lens out. The operation is, naturally, a delicate one, requiring marked skill on the part of the operator, but to the patient it is a comparatively trivial experience. The discovery of cocaine has rendered the operation a painless one; it is not necessary, except in very rare cases, to take a general anesthetic. The operation lasts but a few minutes, and except for the fact that the patient is conscious of what is going on about him he would not know that he was being operated upon. With the recent high development of special surgery the success of cataract operations has steadily improved until now the percentage of successful results is more than 95 per cent.; that is to say, 95 patients, or more, out of every hundred submitted to cataract operation have good useful vision restored to them. Considering these facts, the word cataract has lost most of its horror, and those who are so unfortunate as to be afflicted with this affection may take courage from the fact that their slowly developing blindness need be but a temporary affair, and that they can look forward to the day of restoration of sight.

TOBACCO AND ALCOHOLIC BLINDNESS.

The excessive use of alcoholic stimulants and of tobacco affects the eye, as it may every other organ of the body. It is to be borne in mind that what is excessive for one is not for another, and that, while some men use large quantities of these substances without apparent injury, others may find even one cigar a day too many. The injurious effect of tobacco is noticed in the eye by a peculiar and characteristic lesion of the optic nerve that results, eventually, in atrophy of the nerve structure and consequent destruction of its function. As the nerve-fibers, one after another, are destroyed, visual power gradually disappears until absolute blindness supervenes, upon complete destruction of the nerve.

For some people, then, tobacco is a poison; and since no one can determine who will be one of these susceptible individuals, a safe course will be to use it only in moderation and, should any visual defect appear, cease its use immediately. By proper treatment, instituted early, and total abstention from use of the harmful substances, the disease can be checked and further loss of vision than that noted at the time the patient comes under observation can be prevented. Tobacco alone rarely, if ever, produces any

poisonous effect upon the nerve of sight; almost all of the cases observed have occurred in persons who are addicted to alcoholic stimulants as well as to the use of tobacco. Regarding the different ways of using tobacco, considered from the standpoint of their relative danger to the eyes, it may be said that pipe smoking is probably the most dangerous; after chewing or the use of snuff, cigar smoking is next on the list, and the much-discussed cigarette the least dangerous of all.

SUBJECTIVE SENSATIONS THAT SHOULD CALL ATTENTION TO POSSIBLE EYE DISORDERS.

Headaches.—We have already emphasized the fact that headache is more commonly caused by eye-strain than by any other single thing. The headache produced by defective eyes has no characteristic form: it may be mild or severe; felt only on use of the eyes or felt at some time after their use; be limited to the eyes or the brow, or extend over the entire cranium; may be practically constant or may recur at irregular intervals. The point for the layman to bear in mind is that frequent occurrence of headache demands an examination of the eyes by a competent oculist, and that it is much better to have such an investigation made early or even need-

lessly, as it may appear to him, should no refractive error be discovered, than to dose himself or to be dosed with drugs for the relief of pain that might be obviated by proper care of the eyes.

Eye-pain.—Distinct pain in the eye, other than that spoken of as headache, usually occurs in connection with some inflammatory condition. The most common inflammation is conjunctivitis, in which the pain is of a smarting or stinging character, and accompanied by redness of the eye and an excessive flow of tears. When the pain is of a more severe nature there is usually an affection of greater severity, as iritis or glaucoma. The degree of pain cannot, however, be depended upon as a guide to the seriousness of the disease, since some persons are less sensitive to suffering than are others. Any pain in the eye requires an investigation.

Flashes of Light or Rainbows.—The sensation of light flashes or the appearance of colored rings and rainbow colors about the gas or lamp lights is strong evidence of serious intraocular disease. The latter symptom, particularly, is often the first indication of glaucoma, and as that disease in its chronic form is one of insidious onset and development it is important that ad-

vantage should be taken of this early symptom that proper treatment may be secured.

Tear Drop.—A flow of tears, especially on exposure to cold weather or on windy days, is generally a symptom of obstruction of the channel through which the tears ordinarily escape. Under normal conditions the tears enter a little canal in the lids and flow through the tear-duct into the nose. Any obstruction to this duct prevents outflow of tears in the natural way and while in a warm atmosphere the tears may be removed from the eye by evaporation; on cold days, when evaporation cannot readily occur, the excess of tears flows over the lid margin onto the cheek. In the beginning of such a condition, it may be easy to overcome the obstruction and restore the natural channel or to remove the irritant that is producing an excess of tears. If neglected, the condition is prone to become much more serious, the tears that are retained in the tear-duct or sac becoming infected and thereby producing an abscess that discharges backward through the small opening in the lids or, in some cases, ruptures through the skin and forms an unsightly and disagreeable fistula upon the cheek. After such an inflammatory condition has been permitted to arise the treatment is, naturally, more difficult and oftentimes taxes the

skill of even an expert eye specialist. Practically all cases can be cured, but surgical measures will have to be resorted to except in the early stages of the disease.

Spots Before the Eyes.—The appearance of black spots, "flies," "cobwebs," etc., may indicate some disease inside the eyes or the less dangerous condition of eye-strain. They occur quite frequently with the latter condition, and may be taken as a warning that an examination of the eyes is necessary. Those spots occurring with inflammations of the eye are usually more dense in character and are accompanied by other symptoms which force the patient to seek treatment. Whenever spots appear in the visual field they may be considered as abnormal and demanding attention.

HOW TO MAKE APPLICATIONS TO THE EYES.

Remedies prescribed for use in affections of the eyes are generally ordered in the form of drops or salves, sometimes an eye-bath or a lotion is used, and occasionally one may be called upon to apply a bandage. It would seem to be an easy matter to apply drops to an eye, and yet there is a right and a wrong way to proceed, and, while the right way is easy and causes no discom-

fort, the wrong way may produce a great deal of discomfort and sometimes an injury. It is the common practice now with pharmacists to supply a medicine dropper with all solutions that are to be dropped upon the eye. The first precaution in the use of such a dropper to be observed is that the instrument should never be inverted after the solution has been drawn into the glass tube; if the dropper is held with the rubber end downward and the fluid allowed to run into the rubber and then back into the glass portion it will be noticed that the solution is no longer clear, but contains fine particles of powder that have been washed off the rubber. This fine dust may prove irritating to the eye, and such a procedure has spoiled the drops. Hold the dropper gently by its soft-rubber end, squeeze the rubber, insert the glass tip into the bottle and, relaxing pressure upon the bulb, suck up a few drops of the solution; it is not necessary to draw up a whole tubeful, as one or two drops for each eye are all that are ever required. Keep the dropper in an upright position, *rubber end always up,* without squeezing the bulb until it is desired to eject the drops upon the eye, when gentle pressure will release the fluid one drop at a time.

The second important point is *never to*

drop the fluid directly on the cornea—unless instructed by the physician to so do—because that is the most sensitive portion of the eye, and even a drop of water falling upon it will give pain. The application of drops can be made without any pain whatever by the very simple device of drawing the lower lid down and placing a drop on the exposed inner surface thereof, as shown in the accompanying illustration. (Fig. 2.) When the lid is released the drop immediately spreads itself over the surface of the eye. You may even touch the inner surface of the lower lid with the dropper or the finger without causing discomfort, whereas the slightest drop upon the eyeball produces pain. One drop in the eye, or two at most, is quite sufficient, and anything in excess of that is wasted because it flows into the tear-duct or over upon the cheek.

Applications of ointment may be made in much the same way; the salve being taken up on a cotton-tipped toothpick, for instance, and wiped off on to the everted lower lid.

There is a very prevalent belief that a daily cold *bath* of the eyes (opening and shutting the eyes under water) is beneficial and tends to strengthen them. It may render the eyes more resistant to external influences, such as cold, but it could not in any way affect the sight, and

Fig. 2.—Proper method of applying drops to the eyes.

while it may do no harm it does practically no good. As a medical measure in certain inflammatory conditions of the eye, bathing of the eyes with cold or with hot water may be required. There are several ways of doing this. One may apply the water simply with the hands, as in the act of washing the face, or with the aid of a sponge or soft linen cloth. Again, there is a special "eye cup" made for the purpose; a small oval-shaped glass bowl with concave margins that can be filled with water and held to the eye, fitting neatly over the upper and lower lids, so that the eye is immersed in the fluid. No special apparatus is necessary, however, and the simpler means described above are quite efficient. Another means of applying cold or heat to the eye is to cut small round disks of soft linen and, using several of these together, so as to make a fairly thick pad, lay them on a piece of ice, or wring them out of hot water, and apply the pad over the closed eyelids; as fast as the cold pad becomes warm (or the hot one cools off, if heat is being employed), it can be changed for another that has been in preparation.

Lotions, of whatsoever character prescribed, are to be applied in the same way, similar pads being soaked with the medicine.

Bandages.—In an emergency, a handkerchief

may be folded into a narrow band, the central portion of which is placed over the affected eye, and the ends tied at the back of the head. Where it is necessary to keep the eye bandaged for any length of time, or to remove and replace the bandage frequently, some device less bulky and more convenient is desirable. One of the simplest methods is to prepare a small pad like that described above, or a pad composed of a layer of cotton between two small disks of gauze, and to maintain this in position over the closed eye by the aid of two strips of narrow adhesive plaster, crossing each other, carried from the forehead to the cheek. Still another form of bandage easy to make consists of a square of linen, about two and one-half by two and one-half inches, to each corner of which a piece of tape is attached; this is called the four-tailed bandage and the tape ends are to be tied behind the head.

II.

THE EAR.

THE question may fairly be asked, How many of our readers have ever given the slightest consideration to their ears, really one of their most valuable possessions? If you have ever thought of it at all you have probably considered the ear merely as one of the special sense organs that functions automatically and which you would miss seriously should disease deprive you of its use. But did it ever occur to you that the ear is the most remarkable and the most delicate, if not the most important, of these special sense organs; that the mechanism of the hearing apparatus is one of the marvels of nature; that its importance in the human economy is so great that nature has endeavored to guard and protect it better than any of the other special senses; that, while consisting of the most delicately constructed and perfectly adjusted mechanical arrangement in the body, it performs its physiological functions with the slightest possible intrusion upon the individual's life and the least tax upon his energy and strength? Let us

consider some of these points briefly in order better to understand how the normal function of the ear may be interfered with and how we can best preserve or reclaim hearing power.

The important part which hearing plays in our daily life is appreciated by very few people. Do you know that the ear is far more accurate and truthful in its reports to the brain than is the eye? False visual impressions are very common indeed, but false hearing is very unusual. How often have you had the experience of failing to recognize an old acquaintance until he spoke or laughed; the sound of his voice, though not heard for years perhaps, recalled all of the old memories which sight alone could not stir. Visual memories may be as vivid, at times more so, but they are not so lasting as hearing memories. How striking that advertisement—"His Master's Voice!" A writer in one of the magazines, Dr. Thomson, in *Everybody's* (March, 1909, page 353), calls attention also to the close relationship existing between the ear and the emotions: "Unlike the eye, which chiefly informs the mind, the ear stirs the emotions. We can see a fish writhing in its death agony without pity, but no one can so listen to an animal's shrieks of pain. This is as it should be, for, however wrong the head, the heart

should keep right. Through the ear the profoundest depths of being are revealed."

The moving picture or the pantomime produces no such effect upón our feelings as a similar performance accompanied by dialogue. It is hearing a recital of humorous or pathetic incidents that moves one. It is not the sight of the beggar nor the particular words of his appeal that reach the charitable chord in your heart; it is the mysterious something in his voice, that can reach you only through your ears, that tells you whether or not he is honest and deserving of help. When you read the daily paper you may construct a mental vision of the scenes described or the controversies enacted, but it is the conjured-up word-picture, the mental reproduction of things said, and the inflection in tone with which you imagine them to have been said that makes the deepest impression upon you.

Of course, the loss of any one of our special senses would be a calamity, but if you want a fair idea of the value of your ears just try the experiment of going for one day with the ears closed by pledgets of cotton so as to keep out all sound. You will find yourselves in an absolutely new world; a world without sound, for it is an axiom that there is no sound where there is no ear to hear it. This appears, at first thought,

strange to the untutored mind, but it is quite true. The blow struck by the woodchopper, the explosion of a gun, or any other sound-producing action is merely the setting in motion of atmospheric particles. Suppose we place a lemon on a board and smack it smartly with another piece of wood, what happens? The lemon is squeezed to the bursting point and its juice spurts out in all directions. Suppose the two pieces of wood had been brought together in the same manner when nothing intervened between them but air, what would have happened? You may answer that a sound or a noise would be produced. Not exactly; the coming together of the two boards squeezes or compresses the intervening air and it flows out in all directions; in other words, the air is set in motion. Now if there is an ear within convenient distance the moving waves of air reach it, touch the drum-head, and start it in motion, and this motion is transmitted to the brain, where it makes an impression which is interpreted as a sound. Up to the moment of perception by the brain the only effect of the striking boards had been the production of a wave in the atmosphere, a form of motion that we call "sound waves." It is not actually sound until the ear and brain perceive it, and had there been no ear present the wave would have

passed on into space and died out without producing any effect other than a slight movement in the atmosphere. Sound waves travel slowly and only for short distances, in striking contrast to light waves, which the eye perceives and transmutes into sight. "The motions giving rise to the sensation of light are too minute to originate the sensation of sound; and, conversely, motions capable of producing sound are too gross to generate light. Both light and sound, external to the eye and ear, are only modes of motion, but modes of motion that require specially adjusted organs, and organs of different degrees of sensitiveness, for their transmutation into the sensations of light and sound. The kind of motion that is competent to stimulate the optic nerve has no effect whatever upon the auditory nerve. We cannot see a sound and we cannot hear a color."

A few words may be given to the varying character of sounds. Sound waves that have a regular, rhythmical motion produce sounds which we call musical; and irregular, non-periodical movements give rise to sound sensations known as noises. With such a variety of sound waves as it is possible to produce in the world it is not surprising that it is sometimes difficult to draw a sharp distinction as to what is or is

not musical; not all noises are unmusical and not all so-called music is pure. The ear that is trained to distinguish to a nicety the little differences in sounds finds for its possessor many delights in nature that the ordinary unobservant person misses, and we could all profit immeasurably by cultivating the faculty of hearing. Byron expresses this idea elegantly, when he sings:—

"There's music in the sighing of a reed;
There's music in the gushing of a rill;
There's music in all things if men had ears,—
Their earth is but an echo of the spheres."

Now, thinking of our ears as mechanical instruments for the reception and transmutation of sound waves into sensations of sound, we find that we are dealing with a very mysterious piece of mechanism. In the first place, there is the external ear, called the auricle and external auditory canal, for the collection of these sound waves. At the inner end of this canal, and closing it over, is the drum-head which receives the impact of the collected sound waves. All of this constitutes what is called the receptive portion of the hearing apparatus. Just internal to this is the drum proper, and in this cavity are suspended three small bones, called the auditory ossicles. The outermost one, the malleus, or

hammer, has its long process or handle attached to the head of the drum; the middle one, called the incus, or anvil, is attached to the head of the hammer on one side and on the other to the head of the stapes, or stirrup; the stirrup, the innermost member of the group, is in turn attached by its foot-plate to an opening in the inner wall of the drum, where it comes into contact with the special end apparatus of the nerve of hearing. Within the drum are also two small muscles to control the movements of these bones, and the entire drum, or middle portion of the ear, is called the transmitting apparatus because its principal function is to transmit to the internal ear the sound waves that have been received by the external ear, or receptive portion. Now, the internal ear, the so-called perceptive apparatus, consists of a finely developed nerve-fiber substance of the auditory nerve, or nerve of hearing, buried in a bony-walled receptacle deep in the head. This cavity is filled with fluid, and floating therein is this mass of nerve-fibers, the terminals of the auditory nerve, of different lengths and arranged in a spiral form so that there is a gradual increase in the length of fibers from one end of the spiral to the other. It will be important to remember that the drum of the ear is essentially an air chamber, and that it is con-

nected with the throat by a special tube so that there can be a regular and constant replenishment of air as needed. Having described what constitutes a sound wave and the machinery for utilizing it, let us consider what takes place in the production of a sound.

The atmosphere having been set in motion and the sound wave being received into the canal of the ear, it impinges upon the drum-head and sets in motion the first ossicle, the hammer, which strikes upon the second, the anvil, and that, in turn, transmits the force to the third, the stirrup, from the foot-plate of which the motion is transmitted to the fluid of the internal ear, where it starts a wave-like motion that spreads until the hair-like nerve-fiber which corresponds in length to that wave of fluid is struck and the impression is conveyed by the nerve-fiber to the brain, and the motion is translated into sound. A complicated piece of machinery, you say. Yes, even more so than would appear from this description, for we have endeavored to express the action in the simplest possible terms, but its very complication makes it an instrument of precision, an instrument so delicately constructed that it enables us to hear a great variety of sounds—even to appreciate, as musical, sounds that are as yet far beyond the power of any humanly

devised musical instrument to produce. Our range of hearing for musical sounds alone covers eleven octaves, while the largest organ never has more than eight octaves, the piano, as usually constructed, embraces from seven to seven and one-half octaves, and the violin has but three and one-half octaves; as a matter of fact, neither the highest nor the lowest octaves of the organ or piano are much used, so their practical range is only about five octaves.

Very naturally, an instrument of such delicate structure as the human ear presents many opportunities for getting out of order, even though it is so well protected by having been placed within the heavy bony walls of the cranium. The external portion of the ear is subject to possible accidents, to injuries which may not only cause deformity, but may so distort the auricles as to interfere with its function of collecting sound waves or that may cause obstruction to the admission of these waves into the canal.

MALFORMATIONS.

There is such a thing as congenital malformation of the ears, that is, there may be only a distorted bit of cartilage more or less resembling the natural ear, or there may be several of these

little tubercles, in addition to the normal ear, the so-called supernumerary auricles. Malposition of the ear is more common than malformation; the ear may lie flat against the side of the head or, more commonly, may flare out at right angles thereto. This condition of sail-like ear is more common in boys than in girls, and possibly is due, in some measure at least, to the boyish habit of drawing the hat or cap so far down as to force the ears away from the head. When there is a natural tendency to flaring of the ears in early childhood it can sometimes be prevented by the regular wearing of a nightcap or bandage, but when firmly established or in adult life such ears can be corrected only by an operation.

FOREIGN BODIES IN THE EAR.

Anything which interferes with sound waves reaching the drum-head will, of course, reduce the hearing power. Children not infrequently introduce foreign bodies into the ear. Little Johnny has reached the age where sleight-of-hand begins to be considered an accomplishment, and he proceeds to introduce a glass bead or a dried green pea into the ear and bring it out his nose. Younger sister Mary proudly emulates the example of her skillful brother and succeeds only

in so far as the first part of the trick is concerned. Perhaps neither has the courage to tell mother what has happened, and the foreign body may remain in the ear for many years, without causing any particular discomfort, until a mass of earwax accumulates about it to close the canal and obstruct hearing; I have removed foreign bodies that had been in the ear for more than ten years. A clean foreign body of the mineral type is not likely to do harm in consequence of its mere presence in the ear; of course, important structures like the drum-head may be injured in the act of entrance if the substance entered under force, or if any foreign body reaches the depth of the canal and rests in contact with the drum-head it is likely to occasion considerable discomfort. Vegetable substances like peas and beans may swell and even germinate under the influence of the natural heat and moisture of the canal, and thus cause trouble. Animate bodies such as gnats, flies, spiders, and bugs of various kinds occasionally find their way into the ear, and may occasion much distress by crawling over or fastening their tentacles into the sensitive drum-head. The practical thing for you to remember in connection with the subject of foreign bodies in the ear is that more harm can be done by misdirected or unskillful efforts to remove

the substance than is likely to result from its mere presence. Never attempt to remove a foreign body from the ear with instruments; and among instruments I may class that very useful but dangerous implement, the hairpin. The only measure you may employ with safety is an ear syringe. If you cannot wash out the foreign body by frequent syringings you had better consult a physician; it often requires considerable skill to remove a foreign body without doing damage to the ear itself.

ACCUMULATION OF EARWAX.

What has been said of foreign bodies carried into the ear from without applies equally well to collections of wax in the ear. Some persons are subject to accumulations of this wax, or cerumen as it is technically called, a substance which nature provides for the purpose of catching and holding particles of dust and small foreign bodies which enter the canal, thus preventing their reaching the drum-head. There are several possible reasons for this recurrence in certain individuals; one may secrete more wax than another or for some reason does not get rid of that which is formed. Its repeated accumulation is not a sign of uncleanliness; in fact, it more frequently

results from excessive efforts to keep the ears clean. The employment of aurilaves, toothpicks, hairpins, or the moistened corner of a towel or wash-cloth is more likely to push particles of wax deeper into the canal than to remove them. Nature provided a fairly efficient means of disposing of the wax, and if that fails one can only submit to the necessity of having the secretion periodically removed.

DISEASES OF THE DRUM OF THE EAR.

The middle ear, or drum cavity, is the portion of the hearing apparatus most frequently subjected to disease. Through its connection with the throat and nose there is always the possibility that an inflammation of the latter structures may invade the drum and produce an inflammation or an abscess in the ear. Thus a common cold in the head or an attack of grippe may be accompanied by or produce an involvement of this part of the ear. Chronic diseased conditions in the nose or throat, enlarged or infected tonsils, or adenoids may in the same way, by direct extension of the inflammation to the drum, produce lesions in the hearing organ. Really, about 70 per cent. of all ear diseases arise in just this way. A middle-ear trouble thus induced may pursue

one of two courses: it may result in an abscess of the drum or it may be less severe and cause only a mild inflammation, without the formation of pus, a condition often called *catarrh* of the ear. Either condition is more or less serious to the function of the organ.

In the case of an abscess you have some destruction of tissue and the danger of extension to the brain cavity, possibly giving rise to meningitis, brain abscess, or involvement of the upper end of the large jugular vein, spreading the infection to all parts of the body, through the general circulation. Any of these complications may result in death unless an operation can be promptly performed. The less serious cases show no such immediate complications, but subside after a few days or weeks of discharging pus from the canal, or become chronic and continue indefinitely to discharge such matter. Now, this latter group of cases is much more serious than the public understands. It is unfortunate that in some localities there is a notion that a running ear is of no consequence and that any effort to suppress the discharge will result in trouble,—that the "discharge will break out elsewhere." There is absolutely no substantial basis for such a belief. It seems to have been constructed on the idea that a running ear indicated

the presence of an objectionable humor in the body requiring an outlet. Well, in the first place, the ear is not a sewer for the rest of the body, and, in the second place, the deductions as to the nature of the discharge are absolutely false. Pus running from the ear is an indication of a purely local disease, a chronic abscess of the drum. There is no danger in stopping it, but great danger in permitting it to continue. So long as it is allowed to persist it is a constant source of possible danger. There are numerous instances of persons having had running ears for many years, even as long as fifty years, without any other trouble than the annoyance occasioned by the discharge itself, but, on the other hand, medical records are literally filled with instances of neglected running ears that suddenly set up trouble by extension of the disease to the brain and caused death before the surgeon could institute treatment or in spite of his best efforts to eradicate the disease at that late hour. It is known to all experts in the matter that a running ear is a constant menace to the life of the person having it, and that there is never a day when it may not suddenly flare up and cause serious trouble.

Perhaps you may think the medical man takes such a view because he is an interested party. I

can understand that to be a natural thought, though a very unjust one to my profession. Let me place the situation before you in another way. You all have great respect for the business man's view of things, especially when he is risking money on his opinion. Well, do you know that no reputable life-insurance company will assume a risk on the life of a person who has or recently has had a running ear? That tells the tale better than anything a physician can say to you. Do not misunderstand me regarding the character of the disease. Running ears are serious and dangerous, but the danger lies chiefly in neglect of them. Practically every running ear is susceptible of cure by one form of treatment or another, and no one should be permitted to go without treatment under the mistaken notion that his affection is a trivial one.

"CATARRH" OF THE EAR.

To revert to a consideration of the second type of middle-ear inflammation, the catarrhal affection, we find here no great risk to life, but the products of such an inflammation impair the motility of the ossicles and drum-head and, consequently, diminish the hearing ability; furthermore, such changes are apt to be of a chronic

character and, once started, the ear continues to deteriorate unless the original exciting cause is removed. A large majority of this group of ear affections might be prevented by early and proper attention to the predisposing factors. Many of the abscesses and nearly all of the so-called catarrhal affections of the ear, as I have said, occur to persons suffering with adenoids or diseased tonsils. The history of such cases usually is that the child is a mouth-breather and snores in his sleep; he has occasional attacks of earache, the pain varying in severity but always subsiding after a short time, with or without treatment; repeated attacks occur and, finally, the parents notice that he does not respond when spoken to, or that what they considered a slight degree of deafness is increasing. In the case of an adult the picture is somewhat different; often the deafness creeps on insidiously after a series of head colds or in association with an apparently innocent but persistent nasal catarrh. If your child is having repeated attacks of earache there is almost surely an adenoid growth in his throat or enlarged tonsils, and the sooner you have either of these abnormal growths properly removed the more certain will you be able to prevent injury to his hearing. Medicine will do little good; a thorough and complete operation is re-

quired and should be performed only by one especially skilled in this branch of surgery.

NERVE DEAFNESS AND DEAF-MUTISM.

Diseases of the deeper portion of the ear I need barely mention. The nerve may become involved by extension of one of the middle-ear diseases of which I have spoken, or it may be affected by systemic or hereditary influences. Most of these conditions cannot be forseen, and are therefore not preventable. Their consideration belongs rather to a medical convention than to a public discourse. A child born deaf will not attempt to talk, because we acquire speech through repeating what we hear. If a young child becomes deaf as the result of disease he will cease to talk, even dropping so much of the art as he had acquired. These two classes constitute our deaf-mutes. Deaf-mutes brought under instruction at the proper time may learn to speak, certainly may be taught to understand the language of others, by reading the lip movements, and to talk, if not orally, at least with their fingers and hands; thus growing up into useful, self-supporting members of the community.

A very considerable percentage of the chil-

dren classified as "deaf-mutes" are found, on careful examination, not to be totally deaf. If a child is partially but not absolutely deaf, his hearing should be accurately measured and then developed by training, making use of mechanical devices whenever such afford real assistance, to improve the function and enable him to employ to the fullest extent his fragment of hearing power. Before placing such a child in any school or under any form of instruction, it would be wise to have a careful investigation of the ears, nose, and throat by an expert and, if abnormalities such as adenoids, diseased tonsils, or obstructing growths in the nose (conditions that might affect the physiological function of the ear) be found, or if there exists any inflammatory affection of the ears, the proper corrective treatment should be instituted. Later, having removed, as far as possible, those factors which could cause further trouble or might, at least, interfere with development of the organ, educational measures may be employed with greater assurance of benefit.

It is to be hoped that in this short discourse we may have succeeded in calling your attention to the importance of the organ of hearing, to the necessity for preserving it in good order, and to the fact that most of its diseases could be prevented or cured by a little judicious care at the

right time. As it is sometimes easier to tell people what not to do than to lay down specific rules for positive guidance, let us conclude with a few "Don'ts":—

Don't permit your boy to drag his cap down on his head in such a way as to force his ears forward into false position; the deformity produced is unsightly and will not enhance his beauty nor improve his chances with the girls when he enters the social whirl.

Don't pick your ears with hairpins, toothpicks or ear-spoons, and don't try to see how far you can insert the end of a wash-cloth or towel; be satisfied with cleansing so much of the ear as you can see or feel with the finger, depending on nature to look after the deeper parts.

Don't try to remove wax or any foreign body from your own or anyone's ear with forceps or any of the above-named implements; if you believe there is a foreign body in the ear and you cannot remove it by gentle syringing, you had better consult a competent physician.

Don't neglect a child's complaint of repeated earaches nor delude yourself into the notion that his failure to respond to questions or to participate in conversation is due to lack of attention; when a child is apparently hard of hearing or complains of occasional pains in the ear it is time to have the ears, nose, and throat examined.

Don't imagine that a running ear is a trivial affection; it is always a serious affair and sometimes an extremely dangerous one; proper care of running ears nearly always results in cure, while neglect of such conditions frequently results in an early death.

Don't ignore or neglect a failing ear, one that is simply becoming progressively deafer, because the newspaper advertisements of patent medicines and quack doctors have led you to believe that catarrh is some horrible and incurable disease. Catarrhal deafness is a serious affection, but often it can be cured and almost always it can be checked in its course and prevented from getting worse.

Don't buy a set of artificial ear-drums; they will not help you. Ear affections that can be benefited by such means are very rare.

Don't believe any newspaper advertisements claiming to restore hearing; they are all false. Your own common sense ought to tell you (1) that even the most expert physician could not explain the nature of your trouble nor the line of treatment required without making an examination of you; (2) that advertisements bearing the signature of "Doctor Anybody" are fraudulent, for only "quacks" advertise, and all quacks are liars.

Don't apply poultices to the ear under any circumstances, and don't pour heated oils nor insert such abominable remedies as burnt onion-tops into the ear for relief of pain; the only benefit to be derived from such remedies is due to the application of heat, and this can be obtained in a more cleanly and satisfactory way by use of the hot-water bag; furthermore, oils and fats congeal in the canal and on the drum-head and cause trouble later.

III.

NOSE AND THROAT.

The two special senses that are housed here are by no means of such importance as those considered in the previous chapters. Each adds something to the pleasures of life, but neither is indispensable. The sense of smell enables us to extract from nature an additional appreciation of many of her delights; how much more enjoyable are flowers when, added to their visual beauty, we have the pleasure of their delightful odors! It is almost purely an esthetic sense, only a very few people finding it of any economic value in their lives. To a less degree, the same thing may be said of the sense of taste, a sense that adds very greatly to our pleasures, but which is not at all necessary to life or happiness, nor of material value in the pursuance of ordinary occupations. There are a few persons in the world who make a living from the use of these senses; judging perfumes, testing the values of teas by their taste, etc., but their proportion in the whole laboring population is an insignificant percentage. Total loss of ability to smell or to taste things,

especially the latter, would deprive one of much of the pleasure ordinarily derived from eating, would convert what is generally a delightful pastime into a mere compulsory process and perfunctory function for the sustentation of life; all food tasting alike, the eater would not care much what was served to him and would eat solely for the purpose of maintaining existence.

Partial loss of these senses would, in the same way, be considered a deprivation in that it interferes with that full enjoyment of many things that tend to make us happy and contented, but could not be called a serious calamity. So there is a marked distinction between the two very important senses considered heretofore, sight and hearing,—senses so important to the personal economy as well as to the pleasure-producing elements,—and the two lesser special senses that have their terminal apparatus in the nose and mouth.

Unlike the eye and ear, which are organs designed solely for the production and development of function of the special senses of sight and hearing, the nose and throat are only incidentally concerned in the elaboration of smell and taste. The nose and throat are of much greater importance in the human economy because of their relationship with the organs of

respiration and of nutrition, the channels for admission of air to the lungs and of food to the stomach. Consequently in considering their care we shall have to treat them more particularly with reference to these functions and have but little to say about the special senses.

Anything like a complete description of the anatomical structure of the nose and throat would be an inexcusable waste of space in such a short chapter as this must be, because so much of it is of so little importance to the layman. It would be more to the point to take up for detailed consideration some parts that ought to be better understood by all intelligent persons, and to explain their position, formation, and abnormal development.

NASAL STRUCTURE.

The nose is divided into two equal portions, right and left nasal chambers, by a cartilaginous septum, and this median wall is covered on both sides by smooth mucous membrane. The lateral or outer walls of both sides are of irregular contour, being constructed of three scroll-shaped bones placed one above the other, the lower one being the largest. These bones are rather thin, and by an arrangement which permits their

overlapping and extending out into the nasal chamber, as well as forming the lateral wall, their mucous-membrane-covered surface is more than double what would have existed in a plane-surfaced wall. The reason for providing this extensive area of vascular tissue is found in the fact that one of the functions of the nose is the warming and moistening of inspired air preparatory to its admission to the lungs; the mucous membrane covering the bones and the septum is very vascular, carries a large blood-supply, and the air in passing over this heated membrane has its chill removed and is thus rendered less irritable than cold air would be to the sensitive lung tissue. The roof of the nasal chambers is part of the bony floor of the skull, directly over which lies brain substance. Posteriorly the nasal chambers open into the upper and back part of the throat by orifices that correspond in a measure to the external orifices opening on the face. Between the turbinate bones (those referred to above as scroll-shaped) there are several small openings of canals or cells that connect the nose with neighboring structures. For instance, the tear-ducts, which convey tears from the inner margins of the lids, open into the nose under the inferior turbinates; the big cavities in the cheek-bones (antrum of Highmore) and behind the

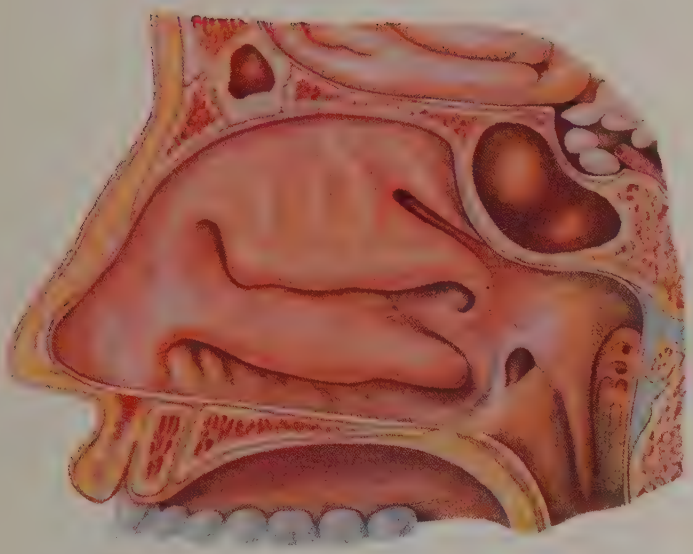

Fig. 3.—Showing lateral aspects of nasal chambers and neighboring structures. The turbinate bones are especially well depicted.

eyebrows (frontal sinuses), as well as the so-called bone sinuses in the center of the head (ethmoid and sphenoid sinuses), communicate with the nose in a similar way, and empty their secretions into the nasal chambers.

From this it will be seen that the physiological function of the nose is threefold. Primarily, it is the organ through which we appreciate odors. In the second place, it is of importance in the act of breathing, not only constituting a channel for the ingress of air, but preparing that air for admission to the lungs. Thirdly, it is a drainage canal for the removal of the mucus and watery secretions of the neighboring cavities and structures of the head. Abnormalities in formation, deformities resulting from injury, or changes resulting from disease may interfere with any or all of these functions. If the turbinate bones are abnormally large or if the septum be deflected to one side, there will be an obstruction of respiration and impaired breathing through that side of the nose. Such deformities may be congenital, that is, present from the time of birth, or may result from injury—a broken nose often heals with deformity of the septum—or there may be a slowly progressive growth of the turbinates until they reach obstructive size. Inflammations of the mucous membrane alone may be accom-

panied by so much swelling that the nasal chambers are occluded and breathing through the nose becomes difficult or even impossible.

RHINITIS (COLD IN THE HEAD).

The so-called "cold in the head" is an acute inflammation of the membrane lining the nose and is caused by micro-organisms. The influence of cold alone does not produce the condition usually referred to when we speak of a cold in the head; the condition is generally an infection, the result of germs gaining entrance to the tissues. The part played by cold is merely a predisposing one. Prolonged exposure to cold reduces the resisting power of the mucous membrane because the effect of cold upon any vascular tissue is to diminish its blood-supply by causing a contraction of the smaller blood-vessels. When the nasal tissue has become weakened and less resistant in this way, germs, which are always lurking about the nose and mouth, take advantage of their opportunity for an attack and produce an inflammation. As elsewhere, the first effect of inflammation is swelling and exudation, which accounts for the stuffy sensation of a "cold" in the nose and the very free flow of secretion that soon follows. Pain and fever are

the other symptoms of inflammation, and we have them in a "cold" in proportion to the amount of area involved and the virulence of the infection. Thus, if the inflammation spreads over the nasal chamber and into the sinuses or channels described, the absorbing surface is larger and the systemic effects greater than if the disease be limited to the walls of the nose proper. The pain is greatly increased if some of the purulent secretions get penned up in the sinuses and the swollen tissues prevent their escape; thus causing a condition of abscess, as it were. So you see a cold in the head is not always a simple thing; it may cause great distress from the local effect only, or it may spread to other regions and even invade the brain with fatal effect. The type of micro-organism has much to do with the character of inflammations that we are accustomed to group under the general head of "colds." The germs most commonly concerned are the simpler pus-producing ones, but sometimes there are especially virulent organisms to be considered, as in the epidemic influenzas, the grippes, where a large percentage of the population may be affected by a specific germ introduced into the community and favored in its dastardly work by an accompanying cold wave. While these "colds" differ in minor details they are in general much alike,

and even the most simple of them, under ordinary circumstances, may in some instances prove to be very dangerous.

A cold in the head should never be neglected. First, because it is not of itself a dangerless thing. Secondly, because it may readily become a chronic inflammation or may cause lesions or modifications in structure of the nose that leave it an injured organ.

CHRONIC RHINITIS (NASAL CATARRH).

A chronic cold in the head, one that has existed for some months or even years, is commonly spoken of as "catarrh," and right here let me say that this is a very much abused word. The outrageously deceptive advertisements of "catarrh cures," promulgated by the patent medicine manufacturers or the quack doctors who prey upon the all too credulous public with humbuggery in various forms, have so played upon this word that perhaps the majority of people believe "catarrh" to be a horribly disgusting, terribly dangerous, and almost incurable disease. Now, as a matter of fact, it is seldom any of these things. They have used the superlative adjectives when those of less degree would better explain the true condition. It is

true that the affection is always unpleasant, sometimes quite objectionable; rarely disgusting either to the victim or his friends. It is true that it sometimes spreads to neighboring structures and causes complications of a serious nature, but only in a very small percentage of cases does it actually endanger life. It is true that it is inclined to be chronic and persistent unless properly treated, but it is not at all to be classed as an incurable affection, the percentage of cases that resist treatment by a competent physician being very small. If colds in the head were properly regarded and wisely cared for in the beginning, there would be very few cases of the chronic, or so-called "catarrhal," type resulting. Catarrh comes, in the main, from the neglect of simple colds or from failure to safeguard one's self against repeated attacks, and may, therefore, be said to be to a large extent a preventable disease. But supposing that inclement weather or unavoidable exposure or inability to take care of one's health results in a condition of chronic nasal inflammation, it is still a disease amenable to treatment, and if treated in the proper way it will almost invariably respond promptly with a cure. The use of a "snuff," the swallowing of pills or potions, the carrying of an electric battery in the pocket, or the wearing of

some fol-de-rol in the shoes is not, however, proper treatment; that is the sort of treatment occasionally advised by quacks or set forth in the advertisements of patented articles, and designed rather to catch the dollars of the foolish than to cure the disease.

Let us consider what "catarrh" really is, that we may understand its most disagreeable and dangerous features, recognize the necessity for getting rid of it, and appreciate the nature of the treatment required to bring about its cure.

In the first place the word "catarrh" is defined in the medical dictionary as "inflammation of a mucous membrane, with a free discharge." Now, that does not sound very terrifying. Any inflammation of any mucous membrane of the body must be accompanied by a discharge; consequently they are all "catarrhal" inflammations, strictly speaking. Pink-eye is a catarrhal inflammation of the eyes; a running ear is a catarrhal inflammation of the ear; appendicitis is a catarrhal inflammation within the appendix; a simple cold in the head is, from a scientific point of view, just as much a catarrh as is the chronic type of nasal inflammation. Why then has the word come into such disrepute? All inflammations must have a beginning, an acute stage. If the inflammation naturally subsides quickly, or is

either cured or proves fatal within a short time, no serious consideration is given by the public to the name applied to it. If the inflammation, from any cause, tarries long and passes into the chronic, meaning long-continued, stage it becomes not only more of a nuisance, but, usually, more dangerous to one's welfare, and its name attracts more attention. Quite naturally, then, the term "catarrh" has attached itself rather to the long-continued inflammations that are marked by a discharge; and since chronic inflammations of the air passages are by all odds the most commonly observed of this type of affection, the word has grown to be rather limited in its use by the public to persistent inflammations of the nose and throat. Unfortunately a considerable number of physicians, feeling the backward pressure of the public mind in this matter, have carelessly fallen into the habit of using the word in the same way, though it is to be hoped still with a better understanding of the actual conditions. As there are in almost every community that is at all thickly settled some persons who from ignorance or neglect have allowed a nasal or throat inflammation to pass into a stage of seriousness, and as the charlatans have by a continuous performance kept before the public artfully contrived pictures of these poor victims, as horrible

examples of what any nasal inflammation might become, a great many laymen have finally accepted the word "catarrh" as describing a very serious group of purulent infections of the nose, throat, or lungs. The condition is utterly unjustifiable and unreasonable, but there is little wonder that the word has come to mean something dreadful to the average person, or that many patients say, with a worried expression on their faces, "Don't tell me I have catarrh." Well, if you have a persistent discharge from your nose or a more or less constant hawking and spitting of something from the throat, you have catarrh; but having said that, we have not pronounced your doom nor put upon you the stigma Biblically applied to the leper—unclean.

Having defined the word, let us now study more particularly the conditions to which it is applied; and since the profession as well as the public generally mean a chronic inflammation of the nose when the term catarrh is used, we shall limit the description to that region. It has been explained that an acute inflammation of the nose, a cold in the head, arises from the action of micro-organisms upon the nasal mucous membrane that has been weakened by exposure to the influences of cold. Exposure to cold may, of course, be of various kinds; having to remain

out for a long time in a cold wind, in a rain or snow storm; being transported suddenly from a warm into a much colder atmosphere; sitting in a cold place with improper or insufficient clothing to protect one against chilling of the body; getting the feet wet and not being able soon to secure dry footwear, and so a hundred different means might be mentioned. As a general rule, an acute cold in the head is for the normal healthy individual a self-limited disease lasting on the average about nine days. Why should some cases become chronic? There are many reasons; the person may not have a normal, healthy resistance, and his weaker tissues fall an easy prey to the germs; the germs may be of an especially virulent nature and produce a more serious or more chronic form of inflammation than usual; instead of taking care of himself and trying to get rid of the cold, the patient may be subjected to continuous or repeated exposures; finally, neglect or inappropriate treatment may result in prolonging an acute infection into a chronic one.

The longer the inflammation exists, the more it tends to spread beyond the original site of infection, and the greater will be the destruction of tissue. Very few chronic cases, then, are limited to inflammation of the mucous membrane of the lateral walls or the septum of the nose. Instead,

the disease has caused an ulceration of the deeper tissues or has invaded the neighboring sinus spaces of which we have spoken. Secretions formed in these sinuses and large cells drain into the nose only imperfectly, and the portion that fails to flow out, the residuum retained in these spaces, tends to keep up a constant reproduction of more inflammation and more pus. In the majority of cases of chronic nasal catarrh an examination discloses the presence of diseased bone or of abscess cavities in these cellular spaces. In this connection it may be noted that this explains why proper treatment resolves itself into providing drainage from these spaces, so as to permit complete removal of the products of inflammation and the taking away of as much dead or diseased bone as interferes with proper drainage and ventilation of the nasal cavities or the presence of which serves to promote further inflammatory action.

The symptoms of chronic nasal catarrh are not difficult of recognition, and little need be said about how to determine the existence of the disease; the exact points of diagnosis do not come within the scope of the layman, it being sufficient that he should recognize the fact that certain symptoms indicate chronic nasal disease and call for the attention of a skilled physician, whose

duty it is to ascertain the location and extent of the trouble and to prescribe the proper treatment. When evidences of a cold in the head are constantly present or recur frequently upon slight provocation, it may be taken for granted that there is something abnormal within the nose. Inability to breathe freely through either side of the nose is proof of some unnatural obstruction, inside the nose or behind it, where it should open into the upper portion of the throat, and if this condition be accompanied by mucous or purulent secretions from the nose the obstruction is most probably caused by inflammatory swelling resulting from a catarrhal process. When there is regularly present a thick, clear mucous discharge or a yellowish purulent discharge from the nose, requiring frequent employment of a handkerchief, there is almost surely a chronic catarrhal inflammation that has extended to the cellular spaces. If the sense of smell is impaired, or if the breath of a person having such a nasal secretion is foul of odor, the chances are that an extensive, destructive nasal inflammation is the cause. Headache is a not uncommon sign of nasal disease, especially when the pain is most pronounced over the eyebrows or deep in the bone below the eyes.

It is not intended to discuss here the methods

and forms of treatment that may be employed for the cure of disease; it is the function of this book only to make it possible for the non-medical reader to recognize the existence of an abnormality or of diseased conditions, and to distinguish in a measure between the simple and the dangerous affections. Self-medication is a curse to any people. The accurate diagnosis and scientific treatment of disease is an art that requires years of painstaking study to even fairly comprehend; leave the practice of medicine to those who have endeavored to fit themselves for its onerous and responsible duties. Not even everyone who holds the title of doctor is competent to treat all diseases. All legitimate practitioners of medicine are expected to know something of all diseases, but the entire field of medicine is so large that it is impossible for any but the most exceptional men to know all about it; hence the growth and development of specialism, men devoting their time to the study of the diseases of one or two organs. It is reasonable to expect that specialists in diseases of the nose and throat should be more capable of understanding and more skillful in the treatment of affections of these organs than the family physician, whose duties require attention to many subjects; and so it is wiser to consult such a one when disease of this region is sus-

pected. Further, the mere proclamation that one is a specialist does not necessarily mean that he is the most learned or skillful of his class; he may really be little better than the general family physician who makes no pretense of special knowledge or training. Unfortunately, the laws at present permit almost anyone possessed of the degree of Doctor of Medicine, and many who have not that much tangible evidence of medical knowledge, to declare themselves to the public as specialists in some branch of medicine. In no other department of medicine has this fact been more abused than in the consideration of diseases of the nose and throat, and there are far too many incompetents prescribing for and even operating within this area. There is no infallible rule for selecting a competent physician or surgeon. The man with the greatest reputation is not always or necessarily the most capable and skillful in his vicinity; an intelligent young man may excel in capability and skill his gray-haired neighbor who is better known in social and professional circles; it can only be said that when the services of a specialist are needed one should carefully consider to whom he will entrust his case and, before deciding, make honest endeavor to secure the best available assistance. If such a rule had been more generally followed in the

past, instead of the haphazard method of permitting anybody to tamper with the nose, or of letting its diseases entirely alone, "catarrh" would never have come to be looked upon with such terror. It has been shown to be a condition that is susceptible of cure if properly treated, but it must be stated that its proper treatment requires the aid of a competent, specially trained physician.

AFFECTIONS OF THE TONSILS.

On either side of the throat, near the base of the tongue and just below the soft palate, may often be seen a small, soft, glandular structure called a tonsil. In the normal adult human being it is scarcely visible, but in children it can frequently be seen as an almond-shaped body projecting slightly from the lateral wall of the pharynx. If the tonsil has any useful function in nature that fact has never been discovered, and at the present time the best medical opinion seems to be that it is a useless, functionless appendage much more likely to be a nuisance than a benefit to its possessor. It is most desirable to be born without tonsils, at least without visible evidences thereof; but being so unfortunate as to have them present at birth, one can only hope that they will disappear early by a process of atrophy. Very

many children miss this blessed occurrence, however, and in them the tonsil shows a tendency to increase in its size, to grow and to become what is technically called "hypertrophied," when they may interfere seriously with the child's health; first, through interference with the acts of breathing and swallowing; secondly, through the ease with which they become infected and inflamed (tonsillitis); thirdly, by their deleterious influence upon the child's speech and hearing.

One can readily understand how the enlarged tonsils, projecting into the throat until they almost or quite meet each other, obstruct the natural act of swallowing and prevent the free ingress of air; nature probably did not intend that we should rely to any great extent upon the mouth for breathing purposes, but, since enlarged tonsils so frequently occur coincidently with nasal obstructions, they interfere at times with this reserve method of respiration. These very large tonsils, however, do much more than merely obstruct the passage of air and food; by their pressure upon neighboring soft tissues they interfere with the muscular action of the soft palate necessary to distinct enunciation in speech, and close the orifices of the tubes which lead from the throat to the ear (the Eustachian tube, that opens just above and behind the soft palate and

the posterior openings of the nose) for the admission of air to the ear-drums. As has been explained elsewhere, closure of these tubes causes a rarefaction of the air in the drum-cavities, a sinking in of the drum-head and either a mild catarrhal inflammation in the ears or a diminution of hearing power, or both. Furthermore, such tonsils are especially prone to infection and to suffer from the effects of cold, so that children having enlarged tonsils are subjected to frequent attacks of sore throat (tonsillitis), and often these attacks are accompanied or followed by complaints of earache, occasionally even by abscesses in the drums.

The influence of the tonsils on the voice is a matter worthy of much more consideration than it has generally received. Children with tonsils almost invariably have a thick voice or a nasal twang, and speak indistinctly. A full, rich, mellow voice is next to impossible for a person whose throat space is restricted by abnormal growths, like hypertrophied tonsils or adenoids. It is important that this should be clearly understood because patients often explain their hesitancy to submit to operation by saying that they fear removal of the tonsils will affect the voice; it will affect the voice, but the effect will be in the nature of an improvement. By removing

the abnormal growth that encroaches upon the resonance space, for the throat is a resonance chamber for the musical voice; by reducing the state of chronic inflammation of the throat that generally accompanies diseased tonsils, and thus getting rid of irritating secretions, the voice is generally much improved in quality and can be used more easily and for longer periods of time without fatigue. Thus singers, lawyers, ministers, and other public speakers who have been seriously handicapped by failure to produce certain notes clearly or inability to speak distinctly, or without effort for more than a few minutes, find themselves able to sing purely, or to speak distinctly and for a prolonged period, after having had their affected tonsils removed.

When the tonsils persist on into adult life they are not only subject to the above-named conditions, but have a further series of disorders peculiarly their own. The very large, hypertrophied tonsil is rarely seen in persons beyond the age of puberty. Any visible tonsil after this time of life is probably abnormal and should be carefully examined to ascertain whether it is diseased and a possible source of trouble complained of, perhaps, at a remote point. It has come to be a recognized fact now that not only are many cases of deafness and other aural

affections directly traceable to diseased tonsils, even though small in size, but that such systemic affections as rheumatism may be attributable to toxins absorbed through or manufactured within the tonsil. Peculiarly enough, it is not the grossly enlarged tonsils that are the worst offenders in this respect, but the small, so-called "submerged" tonsils (tonsils that may be of considerable size, but are not visible as projecting large tonsils because they have been overgrown by and lie buried under the loose tissues of the palate), with cheesy-looking, yellowish particles collected in their crypts that cause the systemic infections.

Every child that is a mouth-breather or that has frequent attacks of sore throat or earache, and every older person who shows signs of beginning or advancing deafness, or who has repeated sore throats or suffers from joint troubles and other complaints of a rheumatic character, should have a careful investigation made of the nose and throat, particularly with reference to the tonsils. The enlarged tonsil of early childhood is not difficult of recognition, even by the parents, but it requires more skill to determine the existence and condition of the smaller diseased tonsils of adults. Many cases of ear disease are cured, many more are checked in their downward career by prompt and proper attention to the

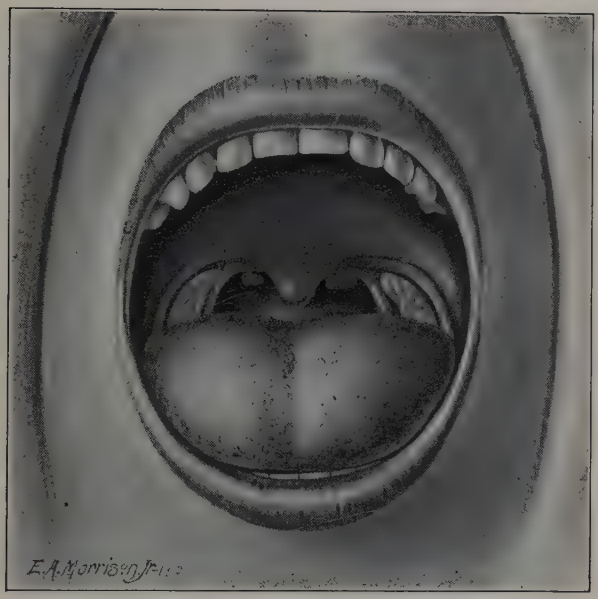

Fig. 4.—View of throat in which can be seen small diseased tonsils and parts of an adenoid hanging below the soft palate on either side of the mouth.

tonsils and to coincident nasal or throat conditions. Many cases of rheumatism, affecting in some instances the large joints of the body, have been relieved and recurrence entirely prevented by the removal of small, but diseased tonsils the existence of which had perhaps not been suspected by the patient. In addition, it may also be said that many cases of such affections of the ears and of the joints cannot be cured nor materially benefited by any other treatment until the diseased tonsils have been removed.

While, as has been stated before, it is not desirable to enter upon a discussion of the treatment of disease here, it seems necessary in this matter to give some advice on the subject. This is necessitated by the fact that the only treatment worthy of consideration is of a surgical nature, and by the further fact that many people are averse to acknowledging the plain, palpable truth of the situation. It is perfectly natural to desire to avoid any sort of an operation; no one is anxious to be operated upon for any ailment whatsoever. It is not, therefore, surprising that some persons should beg that their tonsils be "treated," that applications be tried or medicines administered in the hope of "shrinking" the tonsils or driving them away. Parents not infrequently inquire whether, if the child be let

alone, the tonsil will not atrophy and disappear at about the age of puberty. There is no satisfactory proof and no reasonable assurance that such a thing can or will take place, and while waiting for such an unlikely event to transpire the child is subjected to all the dangers and discomforts that attend retention of the tonsils; the dangers are not inconsiderable in this connection, because such diseases as scarlet fever, whooping-cough, and diphtheria are much more serious when occurring in children with enlarged tonsils than in those with free throats. Medicines may be, and should be, employed to reduce an acute inflammation of the tonsil before attempting an operation, unless an emergency demands a different course; to operate during the stage of acute inflammation increases the risk of infection of the wound and prolongs the period of healing after operation. It must be acknowledged, however, that there is no known medicinal remedy that will by application or injection dispose of a diseased or an enlarged tonsil. To spray and gargle and paint the tonsil, or to swallow pills and potions, for any other purpose than the allaying of acute symptoms of inflammation, is a waste of time and a delusion, if the object is to get rid of the diseased tonsil.

In this connection, and for the purpose of

public education, it may be well at the same time to advise that, having decided upon an operation upon the tonsil, *complete* removal is the thing to be recommended. The oldtime operations of clipping the tonsils, cutting bits off by an instrument acting like a guillotine, or of cauterizing them with electrically heated wires are obsolete and are performed only in exceptional cases at the present time by the best authorities. The modern operation of complete removal of the tonsil is a *major* operation, comparable to removal of the appendix, and requires quite as much, often more, surgical skill than the last-named operation. It should be performed only by thoroughly trained men, and patients should fully appreciate the fact that they are to undergo not a simple but a serious operation. Considerable trouble has arisen from the failure of the public, and not infrequently of the general members of the profession, to recognize the true character of the change that has taken place in consequence of the introduction of this operation. Having grown accustomed to the simple, though often inefficient operation of *tonsillotomy* (taking off a piece of the tonsil) where the operation was performed and the patient walked off to attend to his regular business of the day, they have failed to understand that *tonsillectomy* (com-

pletely dissecting out every particle of the tonsil) is a matter of graver consequence. Tonsillectomy is unquestionably the better operation because it accomplishes what every operation should attempt to do—full and complete removal of the abnormal or diseased structures. It is, however, attended by dangers that seldom appeared in the old, incomplete operation; it requires a high degree of skill for its proper performance, and it produces in most instances a considerable degree of shock, which necessitates a period of complete rest for the patient, varying from three days to a week, according to the constitutional strength of the individual. By recognizing these facts, selecting a competent, specially trained surgeon to perform the work, and preparing one's self as for submission to any other major operation, with a sufficient period of rest following to permit of an untrammeled convalescence, much good and little danger can come from the operation.

ADENOIDS.

In the upper part of the throat, behind the nose, the space that is called the vault of the pharynx or the postnasal space, there is sometimes found a mass of glandular tissue which is spoken of as an "adenoid growth." Under

normal conditions the vault of the pharynx is simply a large air chamber: its roof is a part of the base of the skull; its posterior wall, a portion of the back of the throat, is a thin layer of soft tissues covering the upper cervical part of the spinal column; its lateral walls of mucous-membrane-covered muscular tissues present, on either side, the orifices of the Eustachian tubes which permit the transmission of air to the ear-drums; anteriorly it is marked by the posterior openings of the nasal chambers; it has no floor. Physiologically, air enters this space through the nose and, aside from that small portion that is required for the ears, passes downward into the larynx and bronchial tubes on its way to the lungs. In the soft tissues of the vault there exists in the infant a segment of a ring (completed by extension through the tonsils and the base of the tongue) of gland-like cells. Under certain conditions this may develop into a glandular structure and project into the pharyngeal space, when it is recognized as an adenoid growth. In some instances the growth increases rapidly and may reach such size as to completely fill the postnasal space and even extend below the soft palate so that it is visible on looking into the open mouth. In the majority of cases it does not approach this enormous size, but any adenoid

projection whatsoever in the pharyngeal vault is abnormal and may possibly cause trouble. The growth may appear in one more or less solid mass or may develop as a mass of fimbriated, partially separated projections. Sometimes quite a large mass is present at birth, but more frequently it develops gradually during the early years of life.

Adenoids produce trouble in various ways. First, by completely or partially occluding the mouths of the Eustachian tubes they prevent ingress of air to the ears and cause inflammation in the drum, followed by progressive deafness. Secondly, by covering the posterior openings of the nose the mass acts like a ball-valve to obstruct respiration; air enters the postnasal space through the nose, by forcing the adenoid back, but as expiration takes place the mass falls down again over the orifices and, as the air must escape then through the mouth, that well-known but disagreeable sound called a "snore" is produced. Thirdly, being very susceptible to the influences of cold, adenoids keep the child in an almost constant state of cold in the head with all its consequent disagreeable features. Fourthly, by virtue of the more or less constant state of inflammation maintained and of their absorptive properties they produce a state of autointoxication which

makes the child delicate and sickly, as the result of which a generally stunted growth, an imperfect physical development, retarded mental development, or a general susceptibility to systemic disease is the common outcome.

The symptoms of adenoids are generally easy of recognition. If your baby has "snuffles," cannot feed properly (that is, sucks the breast for a few moments and then has to cease in order to breathe), snores, or is restless in its sleep, consider whether it may not have adenoids. If your older child is a mouth-breather, snores in his sleep, is "hatchet-faced" and "pigeon-breasted," is not up to the average size of children of the same age, has attacks of asthma or of croup, or is dull and stupid at schoolwork, look out for adenoids. If, in addition to any of these symptoms, the child has repeatedly recurring attacks of earache, mild or otherwise, there certainly are adenoids present.

The disastrous effects of adenoids upon the general health can hardly be overstated and are equalled only by the counterbalancing marvelous improvement that takes place when the abnormal growth is removed. It is a common occurrence to see children of 12 to 14 years of age who, because of adenoids, have not progressed in intellect beyond the average child of 7 or 8, and the same

may be said of their stature. In contradistinction to this, it is a delight to watch the rapid physical growth and the mental development that follows the removal of adenoids from such a child.

Nearly all of the things that were said about the evil influences and the dangers of enlarged and diseased tonsils might be here repeated with equal truth about adenoid growths, and the same things are, likewise, true as to what should be done for them. Surgical removal is the only treatment worthy of consideration, and that should be instituted at the earliest convenient moment. Do not wait for the child to outgrow them; he will not do so, and while you are waiting in vain for relief by that means his hearing or his general health may become seriously and permanently impaired, or death may carry him off through some intercurrent disease that is made doubly dangerous because of the presence of these abnormal growths. The child does not need to be "built up" for the operation; he requires the operation in order that he may build up.

The operation is not a serious one, always acknowledging that any operation, however simple it may be, carries with it a certain element of risk, but should be performed by a competent,

skilled surgeon and with every possible precaution against accident and provision for safe convalescence. In all young children the operation should be done under a general anesthetic. An operation attempted without anesthesia is almost sure to be an incomplete, imperfect, and unsatisfactory one. Recurrence after a complete operation is possible, but not probable; recurrences are generally due to the fact that the growth was not completely removed at the right time. In the necessary haste attending an operation upon a child not anesthetized the surgeon cannot be sure he has taken all of the mass, and the chances are strongly against his ability to do so. As after any major operation, there should follow a period of quiet rest with the proper safeguards against possible infection. Finally, bear this point strongly in mind; if your child has an adenoid or enlarged or diseased tonsils, do not hesitate to submit him to the operation for removal even though he seems to be suffering no inconvenience from these abnormalities at the time, because the risks of the operation are infinitesimal, while the dangers of leaving the thing alone are many and great.

INDEX.

Abscess of eardrum, dangers of, 78
middle ear, 78
Accommodation, ocular, 16
Adenoid operation, 116
Adenoidectomy, 116
risks of, 117
Adenoids, 112
as cause of colds, 114
bad effects of, 115
cause of ear affections, 81
cause of ear trouble, 114
causing snuffles, 115
description of, 112
growth of, 113
how they produce trouble, 114
interfering with Eustachian tube, 114
obstruction to respiration, 114
recurrence of, 117
removal of, 116
symptoms of, 115
Alcohol, as cause of blindness, 56
Antrum of Highmore, 90
Anvil, the, 71
Apparatus for transmitting sound waves, 71
hearing, 70
perceptive, of the ear, 71
Applications to eyes, how to make them, 60
Astigmatism, combined with hypermetropia, 22
combined with myopia, 22
correction of, by glasses, 32
discomfort produced by, 23
explanation of, 21
simple, 22
Auditory nerve, 71
ossicle, 70
Auricle, 70
Auricles, supernumerary, 74

Babies, inflammations of their eyes, 38
Bandage, for the eyes, 63
Bathing eyes, how to perform, 63
Blindness, due to ophthalmia neonatorum, 38
due to tobacco and alcohol, 56
Books, best paper for, 44
best plan of columns and lines, 44
type to be used in, 44
Broken nose, 91
Buried tonsils, 188

Camera, nature's, 12
Car-sickness, due to defective eyes, 28
Cataract, 53
description of, 53
development of, 54
in relation to eye-strain, 53
recovery from, 55
ripeness of, 54
treatment of, 54
Catarrh of the ear, 78, 80
prevention of, 81
nasal, 94
cause of ear disease, 81
treatment of, 95
nature of, 96
Cerumen, in the ear, 76
Childhood, care of eyes during, 41
errors of refraction in, 41

Chorea, due to eye-strain, 30
Choroid, description of, 14
Chronic catarrh, causes of, 99
dangers of, 99
symptoms of, 100
treatment of, 102
Ciliary muscle, description of, 14
power of, 25
small size of, 24
Cold applications, to eyes, 62
Colds, cause of, 92
caused by adenoid, 114
dangers of, 93
in head, 92
nature of, 92
treatment of, 95
Conjunctivitis, an infection, 52
cause of, 51
treatment of, 52
Convergence, associated with accommodation, 18
Cornea, description of, 13
Crossed eyes, 44
cause of, 44
treatment of, 46

Deaf-mutes, education of, 82
treatment of, 83
Deaf-mutism, 82
Deafness, congenital, 82
from nasal catarrh, 81
nerve, 82
resulting from adenoids, 81
Desks, in the schoolroom, 43
relation of seat to, 43
Disease of the tonsils, 104
Dropper, how to use for eye drops, 61
Drops, how to put in eye, 61
Drum of the ear, 70
diseases of, 77
Drumhead, 70
Dyspepsia, due to eye-strain, 30

Ear, 65
abscess of, 78
Ear, accumulation of wax in, 76
anatomy of, 70
catarrh of, 78, 80
description of, 70
drum of the, 70
drumhead of, 70
external, 70
flaring, 74
foreign bodies in, 74
internal, 71
malformations of, 73
malposition of, 74
special sense organ, 65
Earache, never neglect, 84
Ear-drums, artificial, 85
diseases of, 77
Education of deaf-mutes, 82
Emmetropia, 18
Epilepsy, excited by eye-strain, 31
Ethmoid sinus, 91
Eustachian tube, 72
External auditory canal, 70
ear, 70
Eye, 11
accommodation of, 16
bandages, 63
bath of, 62
compared to camera, 12
external muscles of, 17
foreign bodies in, 48
function of, 13
inflammation of baby's, 38
its care in infancy, 38
organic defects of, 18
structure of, 13
yellow spot of, 17
Eyeball, description of, 13
Eye-cup, for bathing eye, 63
Eye-headaches 28
Eye-pain, meaning of, 58
Eyes, how to bandage, 63
Eye-strain, cause of digestive disturbances, 29
cause of headache, 28
cause of stomach disorders, 30

Eye-strain, due to errors of refraction, 24
in childhood, 41
in chorea, 30
in nervous affections, 30
local evidences of, 27
manifestations of, 26
part played in causing epilepsy, 31
reflex symptoms of, 27
remote evidences of, 27
removal of, 31
styes in, 27
variation of symptoms in, 28
without local symptoms, 27

Far-sight (see Hypermetropia), 19
Far-sighted (hypermetropic), 19
meaning of, 19
Far-sightedness, a misleading term, 19
Flaring ears, 74
Flashes, of light in the eye, 58
Flies, in visual field, 60
Foreign bodies in ear, 74
removal of, 76
in eye, 48
how to remove, 49
Frontal sinuses, 91

Glasses, value of, in relief of eye-strain, 36
Glaucoma, 52
Granular lids, 49

Hairs, wild, 48
Hammer, the, 71
Headache, cause of, 28
due to defective eyes, 28
nasal origin, 101
ocular origin, 28
when attributable to eyes, 57
Hearing apparatus, 70
Hearing, a marvel of nature, 65
physiology of, 72
power, accuracy of, 66
range of, 73
Highmore's antrum, 90
Hot applications, to eyes, 63
Hypermetropia, action of the lens in, 19
cause of squint, 45
correction of, by glasses, 32
its meaning, 19
shape of eye in, 18
Hypertrophied tonsils, 105

Incus, 71
Indigestion, caused by defective eyes, 29
Infancy, care of eyes in, 38
Internal ear, 71
Iris, description of, 14
Iritis, 52

Lens, action of, 15
description of, 15
Lids, granulation of, 49
Light, in the schoolroom, 43
flashes, in the eye, 58
Lights, best position for reading, 47
value of different, 47
Lotions, use on eyes, 63

Malformations of the ear, 73
Malleus, the, 70
Middle ear, abscess of, 78
cure of, 80
dangers of, 78
catarrh, 78
diseases of, 77
Mouth-breathing, 108, 115
Muscle, ciliary, 14
power of, 25
Muscles, external ocular, 17
Mutism, from deafness, 82
Myopia, 20
action of lens in, 21
correction of, by glasses, 32

Myopia, reason for distant vision in, 21
shape of eye in, 20

Nasal catarrh, 94
a cause of deafness, 81
chronic, treatment of, 102
cold, 92
headaches, 101
mucous membrane, 90
septum, 89
sinuses, 90
infection of, 100
structure, 89
Near-sightedness (myopia), 20
Nerve-deafness, 82
Nerve of hearing, 71
Nervous disorders, due to eye-strain, 30
prostration, due to eye-strain, 30
Nose, 87
anatomy of, 89
deformities of, 91
fracture of, 91
physiology of, 91
structure of, 89
turbinate bones of, 90

Oculist, the broad importance of his work, 32
the work of the, 32
varying skill of, 36
Ointments, how to apply to eye, 62
Old-age sight (presbyopia), 23
Ophthalmia neonatorum (inflammation of baby's eyes), 38
a preventable disease, 38
blindness from, 38
danger of, to others, 40
how to prevent, 39
treatment of, 40
virulence of, 38
of newborn babe, 38
Optic nerve, entrance into eye, 14
Optician, legitimate field for his skill, 34
work and limitations of the, 33
Ossicles, auditory, the function of, 72
ear, 70
Overflowing tears, 59

Pain, in the eye, 58
Perceptive apparatus of the ear, 71
Physiology of hearing, 71
nose, 91
vision, 13
Pink-eye (conjunctivitis), 51
Presbyopia, action of lens in, 23
explanation of, 23
Prevention of ear catarrh, 81
ear disease, 81
earache, 81
Pupil, explanation of, 15

Rainbow lights, in the eye, 58
Reading, position of body in, 47
position of light in, 47
while lying down, 47
Refraction of light, 18
Removal of adenoids, 116
foreign bodies from ear, 75
from eye, 49
tonsils, 111
Retina, description of, 16
Rheumatism, caused by tonsils, 108
Rhinitis, 92
acute, 92
causes of, 92
chronic, 94
Risley's (Dr. S. D.) advice on school arrangements for children, 42
Running ears, 78
dangers of, 79
never neglect, 85
treatment of, 80

Schools, desks in, 43
lighting of, 43
Dr. Risley's advice on means to save children's eyes, 42
Sclerotic, description of, 14
Sense of smell, loss of, 101
Septum of the nose, 89
Shrinking of tonsils, 109
Sick-headache, due to accumulative eye-strain, 29
Sight, appreciation of, 11
Sinus, ethmoid, 91
frontal, 91
sphenoid, 91
Sinuses, nasal, disease of, 100
Smell, loss of sense of, 101
sense of, 87
Snoring, because of adenoids, 114
Snuffles, caused by adenoids, 115
Sound, explanation of, 68
musical, 69
waves, 68
Spasm of eyelids, 26
Spectacles, assistance of, in relieving ocular defects, 36
Sphenoid sinus, 91
Spots, before the eye, 60
Squint, 44
cause of, 45
relationship to errors of refraction, 45
treatment of, 46
Stapes, 71
Stirrup, the, 71
Stomach disorders, due to eye-strain, 30
Structure, nasal, 89
Styes, associated with eye-strain, 27
cause of, 51
prevention of, 51
treatment of, 51
Submerged tonsils, 108
Taste, sense of, 87
Tear drop, meaning of, 59
treatment of, 60
ducts, 90
Throat, the, 87
Tobacco blindness, 56
effect of, on the eyes, 56
Tonsil operations, 111
risks of, 112
Tonsillectomy, 111
risks of, 112
Tonsillitis, 105
Tonsillotomy, 111
Tonsils, affections of, 104
as cause of rheumatism, 108
atrophy of, 104
cause of ear affections, 81
cheesy particles in, 108
dangers of, 110
disappearance of, 104
effect of diseased, 105
failure to atrophy, 110
function of, 104
hypertrophy of, 105
influence on ears, 105
influence on voice, 106
removal of, 111
shrinking of, 109
submerged, 108
treatment of, 189
Trachoma, 49
Transmitting apparatus of the ear, 71
Turbinate bones of nose, 90
Twitching of lids, 26
Type, size of, for easy reading, 44

Voice, affected by tonsils, 106

Waves, sound, 68
Wax, accumulation of, in the ear, 76
Wild hairs, 48
Wrinkles, due to eye-strain, 27

Yellow spot, of the retina, 17

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